COURSE STRUCTURE
for
ELECTRICAL AND ELECTRONICS ENGINEERING
(Applicable for batches admitted from 2023-24)

(UR23)

USHA RAMA
COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)
NH-16, Telaprolu, Unguturu Mandalam,
Near Gannavaram, Krishna District, AP-521109

Ch. Santhi Rani
DEAN ACADEMICS
USHA RAMA COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)
TELAPROLU-521 109.

PRINCIPAL
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TELAPROLU-521 109.

K. Naresh
17/08/2024
B.O.S. CHAIRMAN (EEE)
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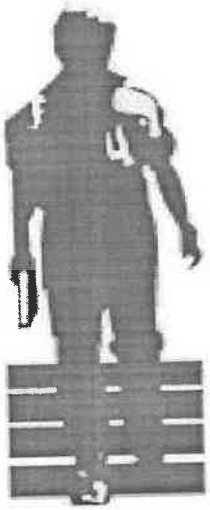

Approved By BOS Members Meeting Held On 04/07/2024

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Usha Rama College of Engineering and Technology
Electrical and Electronics Engineering
Course Structure (UR23)

FIRST SEMESTER (I-Year)

I- Semester								
S. No	**Course Category**	**Course Code**	**Course Name**	**L**	**T**	**P**	**Contact Hrs/wk**	**Credits**
1	BS&H	UR23BS101A	Communicative English	2	0	0	2	2
2	BS&H	UR23BS102A	Chemistry	3	0	0	3	3
3	BS&H	UR23BS103	Linear Algebra & Calculus	3	0	0	3	3
4	ES	UR23ES105A	Basic Civil & Mechanical Engineering	3	0	0	3	3
5	ES	UR23ES104A	Introduction to Programming	3	0	0	3	3
6	BS&H	UR23BS111A	Communicative English Lab	0	0	2	2	1
7	BS&H	UR23BS112A	Chemistry Lab	0	0	2	2	1
8	ES	UR23ES113A	Engineering Workshop	0	0	3	3	1.5
9	ES	UR23ES114A	Computer Programming Lab	0	0	3	3	1.5
10	BS&H	UR23BS115A	Health and Wellness, Yoga	-	-	1	1	0.5
Total				**14**	**0**	**11**	**25**	**19.5**

SECOND SEMESTER(I-Year)

II –SEMESTER								
S. No	**Course Category**	**Course Code**	**Course Name**	**L**	**T**	**P**	**Contact Hrs/wk**	**Credits**
1	BS&H	UR23BS201B	Engineering Physics	3	0	0	3	3
2	BS &H	UR23BS203	Differential Equations & Vector Calculus	3	0	0	3	3
3	ES	UR23BS202B	Basic Electrical and Electronics Engineering	3	0	0	3	3
4	ES	UR23ES205B	Engineering Graphics	1	0	4	5	3
5	ES	UR23ES213B	IT Workshop	0	0	2	2	1
6	PC	UR23PC204B	Electrical Circuit Analysis-I	3	0	0	3	3
7	BS&H	UR23BS211B	Engineering Physics Lab	0	0	2	2	1
8	ES	UR23ES212B	Electrical and Electronics Engineering Workshop	0	0	3	3	1.5
9	PC	UR23BS214B	Electrical Circuits Analysis-I Lab	0	0	3	3	1.5
10	BS&H	UR23BS215B	NSS/NCC/Scouts & Guides/Community Service	-	0	1	1	0.5
TOTAL				13		15	28	20.5

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THIRD SEMESTER (II Year)

S. No	Course Category	Course Code	Course Name	L	T	P	Contact Hrs/wk	C
1	BS	UR23BS301A	ComplexVariables& NumericalMethods	3	0	0	3	3
2	HSMC	UR23HS302	Universal human values understanding harmony andEthical human conduct	2	1	0	3	3
3	ES	UR23ES303A	Electromagnetic Field Theory	3	0	0	3	3
4	PC	UR23PCEE304	Electrical Circuit Analysis-II	3	0	0	3	3
5	PC	UR23PCEE305	DC Machines & Transformers	3	0	0	3	3
6	PC	UR23PCEE311	Electrical Circuit Analysis-II and Simulation Lab	0	0	3	3	1.5
7	PC	UR23PCEE312	DC Machines & Transformers	0	0	3	3	1.5
8	SEC	UR23SEC313A	Data Structures Lab	0	1	2	3	2
			TOTAL	14	2	08	24	20
			MANDATORY COURSE					
9	Audit Course	UR23MC300	Environmental Science	0	0	0	2	0

FOURTH SEMESTER (II Year)

S. No	Course Category	Course Code	Course Name	L	T	P	Contact Hrs/wk	Credits
1	HSMC	UR23HM401A	Managerial Economics & Financial Analysis	2	0	0	2	2
2	ES	UR23ES402A	Analog Circuits	3	0	0	3	3
3	PC	UR23PCEE403	Power Systems-I	3	0	0	3	3
4	PC	UR23PCEE404	Induction and Synchronous Machines	3	0	0	3	3
5	PC	UR23PCEE405	Control Systems	3	0	0	3	3
6	PC	UR23PCEE411	Induction and Synchronous MachinesLab	0	0	3	3	1.5
7	PC	UR23PCEE412	Control Systems Lab	0	0	3	3	1.5
8	SEC	UR23SEC413A	Python Programming Lab	0	1	2	3	2
9	ES	UR23BS414	Design Thinking	1	0	2	3	2
			TOTAL	**15**	**1**	**10**	**26**	**21**

Mandatory Community Service Project Internship Of 8 Weeks Duration During Summer Vacation

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B.Tech – III Semester **COURSE CODE: UR23BS301** **L T P C**
3 0 0 3

COMPLEX VARIABLES & NUMERICAL METHODS

Internal Marks: 30
External Marks:70

Course Objectives:

1. To elucidate the different numerical methods
2. To disseminate the use of different numerical techniques for carrying out numerical integration
3. To familiarize the complex variables
4. To equip the students to solve application problems in their disciplines.

UNIT – I Iterative Methods:
Introduction – Solutions of algebra Secant method – Method of false position method (Simultaneous Equations) **Interpolation:** Newton's forward and backward formulae for interpolation with unequal intervals – Lagrange's interpolation formula

UNIT – II Numerical integration, Solution of ordinary differentials equations by initial conditions:
Trapezoidal rule– Simpson's 1/3 and 3/8th rule-solution of initial value problems by Taylor's series– Picard's method of successive approximations Kutta method (second and fourth order) – Milne's Predictor and Corrector Method

UNIT – III Functions of a complex variable :
Introduction – Continuity – Differentiability Cartesian and polar coordinates Thompson method. Complex integration: Line integral – Generalized integral formula (all without proofs) and problems on above theorems.

UNIT – IV Series expansions and Residue Theorem:
Radius of convergence – Expansion of function in Taylors series , macularian series and Laurent series. Types of Singularities: Isolated – Essential singularities –Pole of order m– Residues –residue theorem (without proof) –evaluation of real integral types $\int_{-\infty}^{\infty} f(x)dx$ and $\int_{0}^{2\pi} f(\cos\theta,\sin\theta)d\theta$.

UNIT – V Conformal mapping:
Transformation by e^z , lnz, z^n, sin z ,cosz ,z+a/z rotation, inversion and bilinear transformation invariance of circles and cross given points .

Text Books:

1. B. S. Grewal, Higher Engineering Mathematics,
2. Micheael Greenberg, Advanced Engineering Mathematics, 2 edition.

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Reference Books:

1. Erwin Kreyszig,Advanced Engineering Mathematics, 10
2. B. V. Ramana,Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.
3. Steven C. Chapra, Applied Numerical Methods with MATLAB for Engineering Science,Tata Mc. Graw Hill Education.
4. M. K. Jain, S.R.K. Iyengar Engineering Computation, New Age International Publications.
5. J. W. Brown and R. V. Churchill 9 th edition,Mc-Graw Hill, 2013:

Course Outcomes:

1. Evaluate the approximate different algorithms. A Lagrange's formulae for equal and unequal intervals (L3)
2. Apply numerical integral techniques different algorithms for approximating the solutions of ordinary differential equations with initial conditions to its analytical computations (L3)
3. Apply Cauchy-Riemann equations to complex functions in order to determine whether a given continuous function is analytic
4. Evaluate the Taylor and Laurent expansions of simple functions, determining the nature of the singularities and calculating residue theorem to evaluate certain integrals (L3)
5. Explain properties of various types of conformal mappings

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B.Tech – III Semester **COURSE CODE: UR23HS302** **L T P C**
3 0 0 3

UNIVERSAL HUMAN VALUES – UNDERSTANDING HARMONY AND ETHICAL HUMAN CONDUCT

Internal Marks: 30
External Marks:70

Course Objectives:

1. To help the students appreciate the essential complementary between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
2. To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.
3. To highlight plausible implications of such a Holistic understanding ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature

Course Topics:

The course has 28 lectures and 14 tutorials in 5 modules. The lectures and tutorials are of 1 hour duration. Tutorial sessions are used to explore and practice what has been to be proposed during the lecture sessions. The Teacher's Manual provides the outline for lectures as well as practice sessions. The teacher is expected to present the issues to be discussed as propositions and encourage the students to have a dialogue

UNIT I Introduction to Value Education
(6 lectures and 3 tutorials for practice session)
Lecture 1: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of education)
Lecture 2: Understanding Value Education
Tutorial 1: Practice Session PS1 Sharing about Oneself
Lecture 3: self-exploration as the Process for Value Education
Lecture4: Continuous Happiness and Prosperity Aspirations
Tutorial 2: Practice Session PS2 Exploring Human Consciousness
Lecture 5: Happiness and Prosperity
Lecture 6: Method to Fulfill the Basic Human Aspirations
Tutorial 3: Practice Session PS3 Exploring Natural Acceptance
UNIT II Harmony in the Human being
(6 lectures and 3 tutorials for practice session)
Lecture 7: Understanding Human being as the Co body.
Lecture 8: Distinguishing between the Needs of the self and the body

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Tutorial 4: Practice Session PS4 Exploring the difference of needs of self and body.
Lecture 9: The body as an Instrument of the self
Lecture 10: Understanding Harmony in the self
Tutorial 5: Practice Session PS5 Exploring Sources of Imagination in the self
Lecture 11: Harmony of the self with the bod
Lecture 12: Programme to ensure self regulation and health
Tutorial 6: Practice Session PS6 Exploring Harmony of self with the body

UNIT III Harmony in the Family and Society

(6 lectures and 3 tutorials for practicesession)
Lecture 13: Harmony in the Family – the Basic Unit of Human Interaction
Lecture 14: 'Trust' – the Foundational Value in Relationship
Tutorial 7: Practice Session PS7 Exploring the Feeling of Trust
Lecture 15: 'Respect' – as the Right Evaluation
Tutorial 8: Practice Session PS8 Exploring the Feeling of Respect
Lecture 16: Other Feelings, Justice in Human-to-Human Relationship
Lecture 17: Understanding Harmony in the Society
Lecture 18: Vision for the Universal Human Order
Tutorial 9: Practice Session PS9 Exploring Systems to fulfil Human Goal

UNIT IV Harmony in the Nature/Existence

(4 lectures and 2 tutorials for practice session)
Lecture 19: Understanding Harmony in the Nature
Lecture 20: Interconnectedness, self the Four Orders of Nature
Tutorial 10: Practice Session PS10 Exploring the Four Orders of Nature
Lecture 21: Realizing Existence as Co
Lecture 22: The Holistic Perception of Harmony in Existence
Tutorial 11: Practice Session PS11 Exploring Co

UNIT V Value based life Implications of the Holistic Understanding

(5lectures and 3 tutorials for practice session)
Lecture 23: Natural Acceptance of Human Values
Lecture 24: Definitiveness of (Ethical) Human Conduct
Tutorial 12: Practice Session PS12 Exploring Ethical Human Conduct
Lecture 25: A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order
Lecture 26: Competence in Professional Ethics
Tutorial 13: Practice Session PS13 Exploring Humanistic
Lecture 27: Holistic Technologies, Production Systems and Management Models-Typical Case Studies
Lecture 28: Strategies for Transition towards and processing

Practice Sessions for UNIT I – Introduction to Value Education

PS1 Sharing about Oneself
PS2 Exploring Human Consciousness
PS3 Exploring Natural Acceptance

Practice Sessions for UNIT II – Harmony in the Human Being

PS4 Exploring the difference of Needs of self and body
PS5 Exploring Sources of Imagination in the self
PS6 Exploring Harmony of self with the body

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Practice Sessions for UNIT III – harmony in the family and society
PS7 Exploring the Feeling of Trust
PS8 Exploring the Feeling of Respect
PS9 Exploring Systems to fulfil Human Goal
Practice Sessions for UNIT IV –Harmony in the Nature/Existence
PS10 Exploring the Four Orders of Nature
PS11 Exploring Co-existence in Existence
Practice Sessions for UNIT V -Professional Ethics
PS12 Exploring Ethical Human Conduct
PS13 Exploring Humanistic Models in Education
PS14 Exploring Steps of Transition towards Universal Human Order

READINGS: Textbook and Teachers Manual
1.The Textbook R R Gaur, R Asthana, G P Bagaria, Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978
2.The Teacher's Manual R R Gaur, R Asthana, G P Bagaria, Values and Professional Ethics, 978-93-87034-53-2

Reference Books:
1. JeevanVidya: EkParichaya, A Nagaraj, JeevanVidyaPrakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J C Kumarappa
8. Bharat Mein Angreji Raj – PanditSunderlal
9. Rediscovering India - by Dharampal
10. Hind Swaraj or Indian Home Rule- by Mohandas k. Gandhi
11. India Wins Freedom - Maulana Abdul Kalam Azad
12. Vivekananda - Romain Rolland (English)
13. Gandhi - Romain Rolland (English)

Mode of Conduct:
Lecture hours are to be used for interactive discussion, placing the proposals about the topics at hand and motivating students to reflect, explore and verify them. Tutorial hours are to be used for practice sessions. While analyzing and discussing the topic, the faculty mentor's role is in pointing to essential elements to help in sorting them out from the surface elements. In other words, help the students explore the important or critical elements. In the discussions, particularly during practice sessions (tutorials), the mentor encourages the student to connect with one's own self and do self exploration.Scenarios may be used to initiate discussion. The student is encouraged to take up "ordinary" situations rather than" extra-ordinary" situations. Such observations and their analyses are shared and discussed with other students and faculty mentor, in a group sitting
Tutorials (experiments or practical) are important for the course. The difference is that the laboratory is everyday life, and practical are how you behave and work in real life. Depending on the nature of topics, worksheets, home assignment and/or activity are

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included. The practice sessions (tutorials) would also provide support to a student in performing actions commensurate to his/her beliefs. It is intended that this would lead to development of commitment, namely behaving and working based on basic human values

It is recommended that this content be placed before the student as it is, in the form of a basic foundation course, without including anything else or excluding any part of this content Additional content may be offered in separate, higher courses. This course faculty from every teaching department, not exclusively by any one department. Teacher preparation with a minimum exposure to at least one 8 –day faculty Program on Universal Human Values is deemed essential

Online Resources:

1. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%201- Introduction%20to%20Value%20Education.pdf
2. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%202- Harmony%20in%20the%20Human%20Being.pdf
3. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%203- Harmony%20in%20the%20Family.pdf
4. https://fdpsi.aicteindia.org/UHV%201%20Teaching%20Material/D3- S2%20Respect%20July%2023.pdf
5. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%205-Harmony%20in%20the%20Nature%20and%20Existence.pdf
6. https://fdp-si.aicte-india.org/download/FDPTeachingMaterial/3-days%20FDPSI%20UHV%20Teaching%20Material/Day%203%20Handouts/UHV%203D%20D3- S2A%20Und%20Nature-Existence.pdf
7. https://www.studocu.com/in/document/kiet-group-of-institutions/universal-human- values/chapter-5-holistic-understanding-of-harmony-on-professional-ethics/62490385

Course Outcomes:

The student will able to understand

1. Define the terms like Natural Acceptance, Happiness and Prosperity (L1, L2)
2. Identify one's self, and • Apply what they have learnt to their own self in different day real life (L3)
3. Relate human values with human relationship and human society. (L4)
4. Justify the need for universal human values and harmony existence(L5)
5. Develop as socially and ecologically responsible engineers (L3, L6)

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B.Tech – III Semester **COURSE CODE: UR23ES303** **L T P C**
3 0 0 3

ELECTROMAGNETIC FIELD THEORY

Internal Marks: 30
External Marks:70

Pre-requisite: Concepts of Differential Equations, Vector Calculus and Electric circuit Analysis.

Course Objectives:

1. To study the production of electric field and potentials due to different configurations of static charges.
2. To study the properties of conductors and dielectrics, calculate the capacitance of different configurations. Understand the concept of conduction and convection current densities.
3. To study the magnetic fields produced by currents in different configurations, application of Ampere's law and the Maxwell's second and third equations.
4. To study the magnetic force and torque through Lorentz force equation in magnetic field environment like conductors and other current loops.
5. To develop the concept of self and mutual inductances and the energy stored.
6. To study time varying and Maxwell's equations in different fourth equation for the induced EMF.

UNIT – I Vector Analysis:
Vector Algebra: Scalars and Vectors, Unit vector, Vector addition and subtraction, Position and distance vectors, Vector multiplication, Components of Coordinate Systems: Rectangular, Cylindrical and Spherical coordinate systems. Vector Calculus: Differential length, Area and Volume. Del operator, Gradient of a scalar, Divergence of a vector and Divergence theorem (definition only). Curl of a v Stroke's theorem (definition only),

Laplacian of a scalar Electrostatics: Coulomb's law and Electric field intensity (EFI) distributions (line and surface charge), Electric flux density, Gauss's law (Maxwell's first equation, $\nabla . D\vec{\mathcal{L}} = \rho\Psi$), Applications of Gauss's law, Electric Potential, Work done moving a point charge in an electrostatic field (second Maxwell's equation for static electric fields,$\nabla \times E\vec{\mathcal{L}} = 0$), Potential gradient, Laplace's and Poison's equations.

UNIT - II Conductors – Dielectrics and Capacitance:
Behavior of conductor in Electric EFI due to an electric dipole, Torque on an Electric dipole placed in an electric field, Current density-conduction , Ohm's law in point form, Behavior of conductors in an electric field, Polarization, dielectric constant , Boundary conditions between conductor to dielectric, dielectric to dielectric and conductor to free space, Capacitance of parallel plate, coaxial capacitors, Energy stored and density in a static electric field.

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UNIT - III Magneto statics, Ampere's Law and Force in magnetic fields:
Biot-Savart's law and its applications viz. Straight current carrying filament, circular, square, rectangle and solenoid current carrying wire Equation ($\nabla . B\vec{\iota} = 0$), Ampere's circuital law and its applications viz. MFI due to an infinite sheet, solenoid, toroidal current carrying conductor, Maxwell's third equation (($\nabla \times \vec{H} = \vec{J}$). Magnetic force, moving charges in a magnetic field current element in a magnetic field, force on a straight and a long current carrying conductor in a magnetic field, force between two straight long, Magnetic dipole, Magnetic torque.

UNIT – IV Self and mutual inductance:
Self and mutual inductance – determination of self cable and mutual inductance between a straight long wire and a square loop wire in the same plane – Energy stored and energy density in a magnetic field.

UNIT – V Faraday's laws of electromagnetic induction
Maxwell's integral and point forms of Maxwell's equations, statically and dynamically induced EMF, Displacement current, Poynting theorem and Poynting vector.

Textbooks:

1. "Elements of Electromagnetics" by Matthew N O Sadiku, Oxford Publications, 7 th edition, 2018.
2. "Engineering Electromagnetics" by William H. Hayt& John. A. Buck Mc. Graw 7 th Editon.2006.

Reference Books:

1. Introduction to Electro Dynamics" by D J Griffiths, Prentice 2 nd edition.
2. "Electromagnetic Field Theory" by Yaduvir Singh, Pearson India, 1
3. "Fundamentals of Engineering Electromagnetics" by Sunil Bhooshan, Oxford University Press, 2012.
4. Schaum's Outline of Electromagneticsby Joseph A. Edminister, MahamoodNavi,4 Edition,2014.

Online Learning Resources:

1. https://archive.nptel.ac.in/courses/108/106/108106073/
2. https://nptel.ac.in/courses/117103065

Course Outcomes: At the end of the course, student will be able to,

1. Compute electric fields and potentials using Gauss law/ solve Laplace's or Poisson's equations for various electric charge distributions.
2. Analyse the behavior of conductors in electric fields, electric diploe and the capacitance and energy stored in dielectrics.
3. Calculate the magnetic field intensity due to current c understanding the application of Ampere's law, Maxwell's second and third law.
4. Estimate self and mutual inductances and the energy stored in the magnetic field.

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B.Tech – III Semester **COURSE CODE: UR23PCEE30** **L T P C**
3 0 0 3

ELECTRICAL CIRCUIT ANALYSIS-II

Internal Marks: 30
External Marks:70

Pre-requisite: Analysis of DC and Single phase AC Circuits, Concepts of differentiation andintegration.

Course Objectives:

1. To understand three phase circuit
2. To analyse transients in electrical systems
3. To evaluate network parameters of given electrical network
4. To apply Fourier analysis to electrical systems
5. To understand graph theory for circuit analysis and to understand the behavior of filters

UNIT – I Analysis of three phase balanced circuits:
Phase sequence, star and delta connection of sources and loads, relation between line and phase quantities, analysis of balanced three phase circuits, and measurement of active and reactive power.

Analysis of three phase unbalanced circuits:
Loop method, Star-Delta transformation technique, two-wattmeter method for measurement of three phase power.

UNIT – II Laplace transforms :
Definition and Laplace transforms of standard functions– Shifting theorem – Transforms of derivatives and integrals, Inverse Laplace transforms and applications

Transient Analysis: Transient response of R-L, R-C and R-L-C circuits (Series and parallel combinations) for D.C. and sinusoidal excitations – Initial conditions - Solution using differential equation approach and Laplace transform approach.

UNIT – III Network Parameters:
Impedance parameters, Admittance parameters, Hybrid parameters, Transmission (ABCD) parameters, conversion of Parameters from one form to other, Conditions for Reciprocity and Symmetry, Interconnection of Two Port networks in Series, Parallel and Cascaded configurations- problems.

UNIT – IV Analysis of Electric Circuits with Periodic Excitation:
Fourier series and evaluation of Fourier coefficients, Trigonometric and complex Fourier series for periodic waveforms, Application to Electrical Systems – Effective value and average value of non-sinusoidal periodic waveforms, power factor, effect of harmonics

UNIT – V Network synthesis
Introduction, Hurwitz polynomials. Positive real functions,reliastion of RL,RC and LC Functions

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Textbooks:

1. Engineering Circuit Analysis, William Hayt and Jack E. Kemmerly, 8th Edition McGraw-Hill, 2013
2. Fundamentals of Electric Circuits, Charles K. Alexander, Mathew N. O. Sadiku, 3rd Edition, Tata McGraw-Hill, 2019

Reference Books:

1. Network Analysis, M. E. Van Valkenburg, 3rd Edition, PHI, 2019.
2. Network Theory, N. C. Jagan and C. Lakshminarayana, 1st Edition, B. S. Publications, 2012.
3. Circuits and Networks Analysis and Synthesis, A. Sudhakar, Shyam Mohan S. Palli, 5th Edition, Tata McGraw-Hill, 2017.
4. Engineering Network Analysis and Filter Design (Including Synthesis of One Port Networks)- Durgesh C. Kulshreshtha Gopal G. Bhise, Prem R. Chadha ,Umesh Publications 2012.
5. Circuit Theory: Analysis and Synthesis, A. Chakrabarti, Dhanpat Rai & Co., 2018, 7th Revised Edition.

Online Learning Resources:

1. https://archive.nptel.ac.in/courses/117/106/117106108/
2. https://archive.nptel.ac.in/courses/108/105/108105159/

Course Outcomes:

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

1. Analyse the balanced and unbalanced 3 phase circuits for power calculations.
2. Analyse the transient behavior of electrical networks in different domains
3. Estimate various Network parameters.
4. Apply the concept of Fourier series to electrical systems.
5. Analyse the filter circuit for electrical circuits

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B.Tech – III Semester **COURSE CODE: UR23PCEE30**

L	T	P	C
3	0	0	3

DC MACHINES & TRANSFORMERS

Internal Marks:30
External Marks:70

Pre-requisite: Principles of Electromechanical Energy Conversion, Electromagnetic fields and Electrical Circuit Analysis.

Course Objectives:

Students will get exposure to

1. Understand the characteristics and applications of DC Machines.
2. Develop problem solving skills about the starting, speed control and testing of DC Machines.
3. Understand the concepts of efficiency and regulation of a transformer by obtaining equivalent circuit
4. Analyze the performance of single-phase transformers and to understand the connection diagrams of three-phase transformers.

UNIT – I DC Generators

Construction and principle of operation of DC machines – EMF equation for generator – Excitation techniques – characteristics of DC generators –applications of DC Generators, Back-emf and torque equations of DC motor – Armature reaction and commutation

UNIT – II Starting, Speed Control and Testing of DC Machines:

Characteristics of DC motors – losses and efficiency – applications of DC motors. Necessity of a starter – starting by 3-point and 4-point starters – speed control by armature voltage and field current control – testing of DC machines – brake test, Swinburne's test –Hopkinson's test–Field Test.

UNIT – III Single-phase Transformers

Introduction to single-phase Transformers (Construction and principle of operation)– emf equation – operation on no-load and on load –lagging, leading and unity power factors loads –phasor diagrams– equivalent circuit –regulation – losses and efficiency – effect of variation of frequency and supply voltage on losses – all day efficiency.

UNIT –IV Testing of Transformers

Open Circuit and Short Circuit tests – Sumpner's test – separation of losses— Parallel operation with equal and unequal voltage ratios– auto transformer – equivalent circuit – comparison with two winding transformers.

UNIT – V Three-Phase Transformers:

Polyphase connections- Y/Y, Y/Δ, Δ/Y, Δ/Δ, open Δ and Vector groups – third harmonics in phase voltages– Parallel operation–three winding transformers-transients in switching –off load and on load tap changers–Scott connection.

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Textbooks:

1. Electrical Machinery by Dr. P S Bimbhra, 7th edition, Khanna Publishers, NewDelhi,1995.
2. Performance and analysis of AC machines by M.G. Say, CBS, 2002.

Reference Books:

1)Electrical Machines by D. P.Kothari, I .J .Nagarth, McGraw Hill Publications, 5th edition

2)Electrical Machinery Fundamentals by Stephen J chapmam McGraw Hill education 2011

3)Generalized of Electrical Machines by Dr.P S Bimbhra ,7th theory edition Khanna Publishers 2021

Online Learning Resources:

1. nptel.ac.in/courses/108/105/108105112
2. nptel.ac.in/courses/108/105/108105155

Course Outcomes:

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

1. Understand the process of voltage build-up in DC generators and characteristics.
2. Understand the process of torque production, starting and speed control of DC motors and illustrate their characteristics.
3. Obtain the equivalent circuit of single-phase transformer and determine its efficiency & regulation.
4. Analyse various configurations of three-phase transformers

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B.Tech – III Semester **COURSE CODE: UR23PCEE311** **L T P C**
0 0 3 1.5

ELECTRICAL CIRCUIT ANALYSIS-II AND SIMULATION LAB

Internal Marks: 30
External Marks:70

Course Objectives:

1. To measure three phase Active and Reactive power
2. To analyze transient behavior of circuits
3. To determine 2-port network parameters
4. To analyze electrical circuits using simulation tools

List of Experiments

Any 10 of the following experiments are to be conducted:

1. Measurement of Active Power and Reactive Power for balanced loads.
2. Measurement of Active Power and Reactive Power for unbalanced loads.
3. Determination of Z and Y parameters.
4. Determination of ABCD and hybrid
5. Verification of Kirchhoff's current law and voltage law using simulation tools.
6. Verification of mesh and nodal analysis using simulation tools.
7. Verification of super position and maximum power transfer theorems using simulation tools.
8. Verification of Reciprocity and Compensation theorems using simulation tools.
9. Verification of Thevenin's and Norton's theorems using simulation tools
10. Verification of series and parallel resonance using simulation tools.
11. Simulation and analysis of transient response of RL, RC and RLC circuits.
12. Verification of self-inductance and mutual inductance by using simulation tools

Course Outcomes:

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

1:understand the power calculation on three phase circuits.
2: Evaluate the time response of given network.
3: Evaluate two port network parameters.
4: Simulate and Analyse electrical circuits using suitable software.

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Note : Minimum 10 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations. In case if the student fails to get eligibility for semester end exams in the current semester, he/she has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted.

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B.Tech – III Semester **COURSE CODE: UR23PCEE312** **L T P C**
0 0 3 1.5

DC MACHINES & TRANSFORMERS LAB

Internal Marks:30
External Marks:70

Course Objectives:

The objectives of this course is

1. To conduct the experiment and plot the characteristics and applications of DC machines.
2. To perform the starting, speed control and testing methods of DC Machines.
3. To determine/Predetermine efficiency and regulation of the transformer through equivalent circuit..

List of Experiments

Any 10 of the following experiments are to be conducted:

1. Speed control of DC shunt motor by Field Current and Armature Voltage Control.
2. Brake test on DC shunt motor- Determination of performance curves.
3. Swinburne's test - Predetermination of efficiencies as DC Generator and Motor.
4. Hopkinson's test on DC shunt Machines.
5. Load test on DC compound generator-Determination of characteristics.
6. Load test on DC shunt generator-Determination of characteristics.
7. Fields test on DC series machines-Determination of efficiency.
8. Brake test on DC compound motor-Determination of performance curves.
9. OC & SC tests on single phase transformer.
10. Sumpner's test on single phase transformer.
11. Scott connection of transformers.
12. Parallel operation of Single-phase Transformers.
13. Separation of core losses of a single-phase transformer.

Online Learning Resources:

1. https://ems-iitr.vlabs.ac.in/List%20of%20experiments.html

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Course Outcomes:

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

1: Demonstrate starting and speed control methods of DC Machines.

2: Apply theoretical concepts in analyzing the performance characteristics of DCMachines

3: Determine the performance characteristics of DC machines using different testingmethods.

4: Determine the performance parameters of single-phase transformer

Note : Minimum 10 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations. In case if the student fails to get eligibility for semester end exams in the current semester, he/she has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted

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B.Tech – III Semester **COURSE CODE: UR23SEC313A** **L T P C**
0 1 2 2

DATA STRUCTURES LAB

Internal Marks:30
External Marks:70

Course Objectives:

1. To provide the knowledge of basic data structures and their implementations.
2. To understand importance of data structures in context of writing efficient programs.
3. To develop skills to apply appropriate data structures in problem solving.

UNIT I Introduction to Data Structures:
Definition and importance of Data structures, Abstract data types (ADTs) and its specifications, **Arrays**: Introduction, 1-D, 2-D Arrays, accessing elements of array, Row Major and Column Major storage of Arrays, **Searching Techniques**: Linear & Binary Search, **Sorting Techniques**: Bubble sort, Selection sort, Quick sort.

Sample experiments:

1. Program to find min & max element in an array.
2. Program to implement matrix multiplication.
3. Find an element in given list of sorted elements in an array using Binary search.
4. Implement Selection and Quick sort techniques.

UNIT II Linked Lists:
Singly linked lists: representation and operations, doubly linked lists and circular linked lists, Comparing arrays and linked lists, Applications of linked lists.

Sample experiments:

1. Write a program to implement the following operations.
   a. Insert b. Deletion c. Traversal
2. Write a program to store name, roll no, and marks of students in a class using circular double linked list.
3. Write a program to perform addition of given two polynomial expressions using linked list

UNIT III Stacks:
Introduction to stacks: properties and operations, implementing stacks using arrays and linked lists, Applications of stacks in expression evaluation, backtracking, reversing list etc

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Sample experiments:

1. Implement stack operations using
   a. Arrays b. Linked list
2. Convert given infix expression into post fix expression using stacks.
3. Evaluate given post fix expression using stack.
4. Write a program to reverse given linked list using stack.

UNIT IV Queues:

Introduction to queues: properties and operations, Circular queues, implementing queues using arrays and linked lists, Applications of queues scheduling, etc.

Deques: Introduction to deques (double-ended queues), Operations on deques and their applications.

Sample experiments:

1. Implement Queue operations using
   a.Arrays b.Linked list
2. Implement Circular Queue using
   a.Arrays b. Linked list
3. Implement Dequeue using linked list.

UNIT V Trees: Introduction to Trees, Binary trees and traversals, Binary Search Tree – Insertion, Deletion & Traversal

Sample experiments:

Implement binary tree traversals using linked list.

4. Write program to create binary search tree for given list of integers. Perform in-order traversal of the tree. Implement insertion and deletion operations

Textbooks:

1. Data Structures and algorithm analysis in C, Mark Allen Weiss, Pearson, 2nd Edition.
2. Fundamentals of data structures in C, Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, Silicon Press, 2008

Reference Books:

1. Algorithms and Data Structures: The Basic Toolbox by Kurt Mehlhorn and Peter Sanders.
2. C Data Structures and Algorithms by Alfred V. Aho, Jeffrey D. Ullman, and John E. Hopcroft.
3. Problem Solving with Algorithms and Data Structures by Brad Miller and David Ranum.
4. Introduction to Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein.
5. Algorithms in C, Parts 1-5 (Bundle): Fundamentals, Data Structures, Sorting, Searching, and Graph Algorithms" by Robert Sedgewick.

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B.Tech – III Semester **COURSE CODE: UR23MC300** **L T P C**
0 0 0 0

ENVIRONMENTAL SCIENCE

Internal Marks: 30
End semester marks :70
External Marks: 00

Course Objectives:

1. To make the students to get awareness on environment
2. To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day –day activities of human life
3. To save earth from the inventions by the engineers.

Unit-1 Multidisciplinary Nature of Environmental Studies:
Definition scope and importance- Need for Public Awareness, **Natural Resources** : Renewable and non-renewable resources-natural sources and non associated problems – Forest resources –use and over-studies – explotation,deforestation case studies-Timber extraction – Mining, dams and other effects on forest and tribal people Water resources – Use and over utilization of surface and ground water-flood, drought conflicts over water, dams – benefits and problems –mineral resources exploitation, environmental effects of extracting and using mineral resources, case studies Food resources: World food problems, changes caused by agriculture and overgrazing effects of modern agriculture, fertilizer studies. – pesticide problem ,water logging ,salinity, case studies Energy resources:

UNIT – II Ecosystems:
Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:a.Forest ecosystem.b.Grassland ecosystem c.Desert ecosystem d.Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity and Its Conservation: Introduction and Definition: genetic, ecosystem diversity – Bio-geographical classification of India – Value of biodiversity consumptive use, Productive use, social, ethical, aesthetic and option values-biodiversity at global, National and local levels- India as a mega-diversity nation-Hot sports of biodiversity- Threats to biodiversity: habitat loss, poaching of wildlife-man wild life conflicts- Endangered and endemic species of India- Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

UNIT – III Environmental Pollution:
Definition, Cause, effects and control measures of a.Air Pollution b.Water pollution,c. Soil pollution d. Marine pollution e.Noise pollution f.Thermal pollution g.Nuclear hazards

Solid Waste Management: Causes, effects and control measures of urban and industrial

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Course Outcomes: At the end of the course, Student will be able to

1. Identify the role of data structures in organizing and accessing data.
2. Design, implement, and apply linked lists for dynamic data storage.
3. Develop applications using stacks and queues
4. Design and implement algorithms for operations on binary trees andtrees.
5. Devise novel solutions to small scale programming challenges involving data structuressuch as stacks, queues, Trees

Note1 :

Minimum 10 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations. In case if the student fails to get eligibility for semester end exams in the current semester, he/she has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted

Note 2:

Skill Oriented Course shall carry 100 marks and shall be evaluated through continuous assessments during the semester for 30 sessional marks and end examination shall be for 70 marks. Day-to-day work in the class / laboratory shall be evaluated for 30 marks by the concerned teacher based on the regularity/assignments/viva/mid semester test. The end examination similar to practical examination pattern shall be conducted by the concerned teacher and an expert in the subject nominated by the principal.

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wastes – Role of an individual in prevention of pollution- Pollution case studies, Disaster management-floods, earthquake, cyclone and landslides

UNIT – IV Social Issues and the Environment:

From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

UNIT – V Human Population And The Environment:

Population growth, variation among nations. Population explosion – Family Welfare Programmes. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

Field Work: Visit to a local area to document environmental assets River/forest grassland/hill/mountain-

Visit to a local polluted site- Urban/Rural/Industrial/Agricultural- Study of common plants, insects, and birds- river, hill slopes, etc.

Reference Books:

1. Deeksha Dave and E.Sai Baba Reddy, Textbook of Environmental Science,
2. 2/e, Cengage Publications, 2012. 2. M.Anji Reddy, "Textbook of Environmental Sciences and Technology", BS Publication, 2014
3. J.P. Sharma, Comprehensive Environmental studies, Laxmi publications, 2006. J. Glynn Henry and Gary W. Heinke, Environmental Engineering Sciences and Prentice Hall of India Private limited, 1988

Online Learning Resources:

1. https://onlinecourses.nptel.ac.in/noc23_hs155/preview
2. https://www.edx.org/learn/environmental-science/rice-university-ap-r-environmental-science-part-3-pollution-and resources?index=product&objectID=course-3a6da9f2-d84c-4773-838 - 1b2f8f6a75f2&webview=false&campaign=AP%C2%AE+Environmental+Science ++Part+3%3A+Pollution+and+Resources&source=edX&product_category=cour seplacement_url=https%3A%2F%2Fwww.edx.org%2Flearn%2Fenvironmental-science
3. http://ecoursesonline.iasri.res.in/Courses/Environmental%20Sc ience- I/Data%20Files/pdf/lec07.pdf

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Course Outcomes:

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

1. Grasp-multi disciplinary nature of environmental studies and various multi disciplinary nature of environmental studies and various renewable and non-renewable resources.
2. Understand flow and bio geo- chemical cycles and ecological pyramids.
3. Understand various causes of pollution and solid waste management and related preventive measures.
4. Understand the rainwater harvesting, watershed management, ozone layer depletion and waste land reclamation.
5. Illustrate the causes of population explosion, value education and welfare programs

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B.Tech – IV Semester **COURSE CODE: UR23HM401A** **L T P C**
2 0 0 2

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Internal Marks: 30
External Marks:70

Course Objectives:

1. To inculcate the basic knowledge of microeconomics and financial accounting
2. To make the students learn how demand is estimated for different products, input- output relationship for optimizing production and cost
3. To Know the Various types of market structure and pricing methods and strategy
4. To give an overview on investment appraisal methods to promote the students to learn how to plan long-term investment decisions.
5. To provide fundamental skills on accounting and to explain the process of preparing financial statements.

UNIT - I Managerial Economics:

Introduction – Nature, meaning, significance, functions, and advantages. Demand- Concept, Function, Law of Demand - Demand Elasticity- Types – Measurement. Demand Forecasting- Factors governing Forecasting, Methods. Managerial Economics and Financial Accounting and Management.

UNIT – II Production and Cost Analysis:

Introduction – Nature, meaning, significance, functions and advantages. Production Function– Least- cost combination– Short run and long run Production Function- Isoquants and Is costs, Cost & Break-Even Analysis - Cost concepts and Cost behaviour- Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems).

UNIT – III Business Organizations and Markets:

Introduction – Forms of Business Organizations- Sole Proprietary - Partnership - Joint Stock Companies - Public Sector Enterprises. Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition Monopoly- Monopolistic Oligopoly-Price-Output Determination - Pricing Methods and Strategies

UNIT - IV Capital budgeting:

Introduction Nature, meaning and significance, types of working capital,Comonents sources of short term and long term capital-estimating working capital requirements-Capital Budgeting- Features, Proposals, Methods and Evaluation. Projects-pay back method-Accounting Rate of Return(ARR)-net present value(NPV) Internal Rate Return(IRR)Method(sample problems)

UNIT – V Financial Accounting and Analysis:

Introduction – Concepts and Conventions Double-Entry Bookkeeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). Introduction to Financial Analysis- Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability

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Textbooks:

1. Varshney & Maheswari: Managerial Economics, Sultan Chand.
2. Aryasri: Business Economics and Financial Analysis, 4/e, MGH.

Reference Books:

1. Ahuja Hl Managerial economics Schand.
2. S.A. Siddiqui and A.S. Siddiqui: Managerial Economics and Financial Analysis, New Age International.
3. Joseph G. Nellis and David Parker: Principles of Business Economics, Pearson, 2/e, New Delhi.
4. Domnick Salvatore: Managerial Economics in a Global Economy, Cengage.

OnlineLearningResources:

1. https://www.slideshare.net/123ps/managerial-economics-ppt
2. https://www.slideshare.net/darkyla/business-organizations-19917607
3. https://www.slideshare.net/balarajbl/market-and-classification-of-market
4. https://www.slideshare.net/ruchi101/capital-budgeting-ppt-59565396
5. https://www.slideshare.net/ashu1983/financial-accounting

Course Outcomes:

1. Define the concepts related to Managerial Economics, financial accounting and management(L2)
2. Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets (L2)
3. Apply the Concept of Production cost and revenues for effective Business decision (L3)
4. Analyze how to invest their capital and maximize returns (L4)
5. Evaluate the capital budgeting techniques. (L5)
6. Develop the accounting statements and evaluate the financial performance of business entity (L5)

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B.Tech – IV Semester **COURSE CODE: UR23ES402A**

L	T	P	C
3	0	0	3

ANALOG CIRCUITS

Internal Marks: 30
External Marks:70

Pre-requisite: Knowledge of electronic components and semiconductor devices, number systems, binary arithmetic, Boolean or switching algebra, and logic gates.

Course Objectives:

1. To acquire the basic knowledge on clippers, clampers & biasing circuits.
2. To determine the h-parameters of a transistor circuit & understand the feedback amplifiers.
3. To know the operation of oscillators and operational amplifier.
4. To understand the applications of operational amplifier.
5. To acquire the knowledge on IC 555 timer and theirapplications.
6. To know the operation of Analog to Digital Converters and Digital to Analog Converters.

Unit – 1:Diode clipping and clamping circuits:

Diode clippers, clipping at two independent levels, Transfer characteristics of clippers, clamping circuit operation.DC biasing of BJTs: Load lines, Operating Point, Bias Stability, collector to base bias, Self-Bias, Stabilization against variation in V_{BE} and β for the self bias circuit, bias compensation, thermal runway and thermal stability

Unit – II:Small Signals Modelling of BJT:

Analysis of a Transistor Amplifier Circuit using h-parameters, Simplified CE Hybrid Model, Analysis of CE, CC, CB Configuration using Approximate Model, Frequency Response of CE and CC amplifier

Feedback Amplifiers: Classification of Amplifiers, the Feedback Concept, General Characteristics of Negative-Feedback Amplifiers, Effect of Negative Feedback upon Output and input resistances ,voltages –series feedback,current – series feedback.current shunt feedback.voltage shunt feedback

Unit –III : Oscillator Circuits: Barkhausen criterion of oscillation, oscillator operation-C phase shift Oscillator,Wien -Bridge oscillator, Crystal Oscillator

Operational Amplifiers: Introduction, Basic information of Op-Amp, Ideal Operational Amplifier, Block Diagram Representation of Typical Op-Amp, OP-Amps Characteristics: Introduction, DC and AC characteristics, 741 op-amp & its features.

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Unit – IV:OP-AMPS Applications:

Introduction, Basic Op-Amp Applications, Instrumentation Amplifier, AC Amplifier, V to I and I to V Converter, Sample and Hold Circuit, Log and Antilog Amplifier, Multiplier and Divider, Differentiator, integrator.

Comparators and Waveform Generators: Introduction, Comparator, Square Wave Generator, Monostable Multivibrator, Triangular Wave Generator, Sine Wave Generators

Unit – V:Timers and Phase Locked Loop:

Introduction to 555 timer, functional diagram, Monostable and Astable operations and applications, Schmitt Trigger, PLL block schematic, principles and description of individual blocks, 565 PLL, Applications of VCO (566).

Digital to Analog And Analog to Digital Converters: Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, A-D Converters – parallel Comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC, DAC and ADC Specifications

Textbooks:

1. Linear Integrated Circuits – D. Roy Choudhury, New Age International (p) Ltd, 2nd Edition, 2003.
2. Electronic Devices and Circuits – David Bell, Oxford, 5thEdition, 2008.
3. Electronic Principles–Malvino, Albert Paul, and David J. Bates, McGraw-Hill/Higher Education, 2007.
4. Operational Amplifiers and Linear Integrated Circuits– Gayakwad R.A, Prentice Hall India, 2002.
5. Operational Amplifiers and Linear Integrated Circuits –Sanjay Sharma, Kataria& Sons, 2ndEdition, 2010.

Online Learning Resources:

1. https://nptel.ac.in/courses/122106025.
2. https://nptel.ac.in/eourses/108102112.

Course Outcomes:

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

1. Analyze diode clipping and clamping circuits. Understand different types of biasing circuits of a transistor.
2. Use small signal modeling for transistor circuit analysis and illustrate the operation of feedback amplifiers.
3. Understand operation of oscillators, operational amplifier and their applications.
4. Use 555 timers in multi-vibrators, Schmitt Trigger and PLL applications.

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B.Tech – IV Semester **COURSE CODE:UR23PCEE403** **L T P C**
3 0 0 3

POWER SYSTEMS-I

Internal Marks: 30
External Marks:70

Pre-requisite: Electrical Circuit Analysis

Course Objectives:

1. To study principle of operation of different components of a hydro and thermal power stations.
2. To study principle of operation of different components of a nuclear power stations.
3. To study constructional and operation of different components of an Air and Gas Insulated substations.
4. To study different types of cables and distribution systems.
5. To study different types of load curves and tariffs applicable to consumers.

Unit I:Hydroelectric Power Stations:
Selection of site, general layout of a hydroelectric power plant with brief description of major components and principle of operation

Thermal Power Stations:
Selection of site, general layout of a thermal power plant. Brief description of components: boilers, super heaters, economizers and electrostatic precipitators, steam turbines: impulse and reaction turbines, condensers, feed water circuit, cooling towers and chimney.

Unit II:Nuclear Power Stations:
Location of nuclear power plant, working principle, nuclear fission, nuclear fuels, nuclear chain reaction, nuclear reactor components: moderators, control rods, reflectors and coolants, types of nuclear reactors and brief description of PWR, BWR and FBR. Radiation: radiation hazards and shielding, nuclear waste disposal.

UNIT – III Substations:
Air Insulated Substations – indoor & outdoor substations, substations layouts of 33/11 kV showing the location of all the substation equipment. Bus bar arrangements in the sub- stations: simple arrangements like single bus bar, sectionalized single bus bar, double bus bar with one and two circuit breaker , main and transfer bus bar system with relevant diagrams **Gas Insulated Substations (G S)** – advantages of gas insulated substations, constructional aspects of GIS, comparison of air insulated substations and gas insulated substations.

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UNIT – IV underground cables:
Types of cables, construction, types of insulating materials, calculation of insulation resistance, stress in insulation and power factor of cable. Capacitance of single and 3-Core belted Cables. Grading of cables: capacitance grading and intersheath grading.**Distribution Systems:**classification of Distribution systems,A.C Distribution ,Overhead versus Underground System,connection Schemes of Distribution system ,requirements of distribution systems

UNIT – V Economic Aspects & Tariff:
Economic Aspects – load curve, load duration and integrated load duration curves, discussion on economic aspects: connected load, maximum demand, demand factor, load factor, diversity factor, plant capacity factor and plant use factor, base and peak load plants.Tariff Methods– Costs of generation and their division into fixed, semi-fixed and running costs, desirable characteristics of a tariff method, tariff methods: simple rate, flat rate, block-rate, two-part, three–part, and power factor tariff methods.

Textbooks:

1. S. N. Singh, Electric Power Generation, Transmission and Distribution, PHI Learning Pvt Ltd, New Delhi, 2nd Edition, 2010
2. J.B.Gupta, Transmission and Distribution of Electrical Power, S.K.Kataria and sons,10th Edition, 2012

Reference Books:

1. I.J. Nagarath & D.P. Kothari, Power System Engineering, McGraw-Hill Education, 3rd Edition, 2019.
2. C.L.Wadhwa, Generation, Distribution and Utilization of Electrical Energy, New Age International Publishers, 6th Edition, 2018.
3. V. K. Mehta and Rohit Mehta, Principles of Power , 4th Edition, System, S. Chan 2005.
4. Turan Gonen, Electric Power Distribution System Engineering, McGraw-Hill, 1985.
5. Handbook of switchgear, BHEL, McGraw-Hill Education, 2007.

Online Learning Resources:

1. https://nptel.ac.in/courses/108102047

Course Outcomes: At the end of the course, the student will be able to,

1. Understand the different types of power plants, operation of power plants.
2. Describe the different components of air and gas insulated substations.
3. Discuss the construction of single core and three core cables and describe distribution system configurations.
4. Analyse different economic factors of power generation and tariffs

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B.Tech – IV Semester **COURSE CODE: UR23PCEE404** **L T P C**
3 0 0 3

INDUCTION AND SYNCHRONOUS MACHINES

Internal Marks: 30
External Marks: 70

Pre-requisite: Principles of Electromechanical Energy Conversion, Electromagnetic fields and Electrical Circuit Analysis.

Course Objectives:

Students will get exposure to understand the concepts of

1. characteristics, starting and testing methods of Induction Motor
2. torque production and performance of Induction Motor.
3. In determining the performance parameters of Induction Motor.
4. working of synchronous machines

UNIT-I: 3-phase induction motors:
Construction of Squirrel cage and Slipring induction motors– production of rotating magnetic field – principle of operation – rotor emf and rotor frequency – rotor current and power factor at standstill and during running conditions– rotor power input, rotor copper loss and mechanical power developed and their inter-relationship –equivalent circuit – phasor diagram

UNIT-II:Performance of 3-Phase induction motors:
Torque equation – expressions for maximum torque and starting torque – torque-slip characteristics – double cage and deep bar rotors –No load, Brake test and Blocked rotor tests – circle diagram for predetermination of performance- methods of starting –starting current and torque calculations -speed control of induction motor with V/f control method, rotor resistance control and rotor emf injection technique-crawling and cogging –induction generator operation

UNIT – III: Single Phase Motors:
Single phase induction motors– constructional features – double revolving field theory,Cross field theory – equivalent circuit- starting methods: capacitor start capacitor run, capacitor start induction run, split phase & shaded pole, AC series motor

UNIT – IVSynchronous Generators
Constructional features of non-salient and salient pole type alternators- armature windings – distributed and concentrated windings – distribution& pitch factors – E.M.F equation – armature reaction – voltage regulation by synchronous impedance method – MMF method and Potier triangle method –two reaction analysis of salient pole machines -methods of synchronization- Slip test – Parallel operation of alternator

UNIT-V Synchronous Motors:
Synchronous motor principle and theory of operation – Effect of excitation on current and power factor– synchronous condenser –expression for power developed –hunting and its suppression – methods of starting

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Text Books:

1. Electrical Machinery, Dr. P.S. Bhimbra, Khanna Publishing, 2021,First Edition.
2. Performance and analysis of AC machines by M.G. Say, CBS, 2002.

Reference Books:

1. Electrical machines, D.P. Kothari and I.J. Nagrath, McGraw Hill Education, 2017, Fifth Edition.
2. Theory & Performance of Electrical Machines by J.B.Gupta, S.K.Kataria& Sons, 2007.
3. Electric Machinery, A.E.Fitzgerald, Charles kingsley, Stephen D.Umans,
   McGraw-Hill, 2020, Seventh edition.

Online Learning Resources:

1. nptel.ac.in/courses/108/105/108105131
2. https://nptel.ac.in/courses/108106072

Course Outcomes:

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

1. Explain the construction and operation of three-phase induction motor.
2. Analyse the performance of three-phase induction motor.
3. Describe the working of single-phase induction motors.
4. Analyse the performance of Synchronous generators and motors.

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B.Tech – IV Semester COURSE CODE: UR23PCEE405 L T P C
3 0 0 3

CONTROL SYSTEMS

Internal Marks: 30
External Marks: 70

Pre-requisite: Basic Engineering Mathematics

Course Objectives:

1. To obtain the mathematical models of physical systems and derive transfer function.
2. To determine the time response of systems and analyse system stability.
3. To analyse system stability using frequency response methods.
4. To design compensators using Bode diagrams.
5. To obtain the mathematical models of physical systems using state space approach and determine the response.

UNIT – I Mathematical Modelling Of Control Systems
Classification of control systems - open loop and closed loop control systems and their differences - Feedback characteristics - transfer function of linear system, differential equations of electrical networks- translational and rotational mechanical systems – transfer function of Armature voltage controlled DC servo motor - block diagram algebra –representation by signal flow graph – reduction using Mason's gain formula.
UNIT – IITime Response Analysis:
Standard test signals – time response of first and second order systems – time domain specifications - steady state errors and error constants - effects of proportional (P) - proportional integral (PI) - proportional derivative (PD) proportional integral derivative (PID) systems
.Stability And Root Locus Technique: concept of stability – Routh's stability criterion – limitations of Routh's stability, root locus concept – construction of root loci (simple problems) - Effect of addition of Poles and Zeros to the transfer function.
UNIT –III Frequency Response Analysis
Introduction to frequency domain specifications – Bode diagrams – transfer function from the Bode diagram –Polar plots, Nyquist stability criterion- stability analysis using Bode plots (phase margin and gain margin).
UNIT – IV Classical Control Design Techniques
Lag, lead, lag-lead compensators - physical realisation - design of compensators using Bode plots.

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UNIT – V State Space Analysis of LTI Systems

Concepts of state - state variables and state model - state space representation of transfer function: Controllable Canonical Form - Observable Canonical Form - Diagonal Canonical Form - diagonalization using linear transformation - solving the time invariant state equations State Transition Matrix and its properties- concepts of controllability and observability.

Text Books:

1. Modern Control Engineering by Kotsuhiko Ogata, Prentice Hall of India, 2010.
2. Automatic control systems by Benjamin C.Kuo, Prentice Hall of India, 2nd Edition.

Reference Books:

1. Control Systems principles and design by M.Gopal, Tata Mc Graw Hill education Pvt Ltd., 4th Edition.
2. Control Systems Engineering by Norman S. Nise, Wiley Publications, 7th edition
3. Control Systems by Manik Dhanesh N, Cengage publications.
4. Control Systems Engineering by I.J.Nagarath and M.Gopal, Newage Publications, 5th Edition.
5. Control Systems Engineering by S.Palani, Tata Mc Graw Hill Publications.

Online Learning Resources:

1. https://archive.nptel.ac.in/courses/107/106/107106081/
2. https://archive.nptel.ac.in/courses/108/106/108106098/
3. https://nptelvideos.com/video.php?id=1423&c=14

Course Outcomes:

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

1. Derive the transfer function of physical systems and determine overall transfer function using block diagram algebra and signal flow graphs.
2. –Obtain the time response of first and specifications of second order systems and determine error constants. Analyze the absolute and relative stability of LTI systems using Routh's stability criterion and root locus method.
3. Analyze the stability of LTI systems using frequency response methods.
4. Design Lag, Lead, Lag-Lead compensators to improve system performance using Bode Diagrams.
5. Apply state space analysis concepts to represent physical systems as state models, derive transfer function and determine the response. Understand the concepts of controllability and observability

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B.Tech – IV Semester **COURSE CODE: UR23PCEE411**

L	T	P	C
0	0	3	1.5

INDUCTION AND SYNCHRONOUS MACHINES LAB

Internal Marks: 30
External Marks: 70

Course Objectives:

The objectives of this course is

1. To apply the concepts of speed control methods in 3-phase Induction Motor.
2. To experimentally develop circle diagram and obtain equivalent circuit to analyse the performance of 3-phase induction motor
3. To apply the concepts of power factor improvement on single phase Induction Motor
4. To perform various testing methods on alternators for experimentally predetermine the regulation

List of Experiments

Any 10 experiments of the following are required to be conducted

1. Brake test on three phase Induction Motor.
2. Circle diagram of three phase induction motor.
3. Speed control of three phase induction motor by V/f method.
4. Equivalent circuit of single-phase induction motor.
5. Power factor improvement of single-phase induction motor by using capacitors.
6. Load test on single phase induction motor.
7. Regulation of a three -phase alternator by synchronous impedance &MMF methods.
8. Regulation of three-phase alternator by Potier triangle method.
9. V and Inverted V curves of a three-phase synchronous motor.
10. Determination of X_d, X_q& Regulation of a salient pole synchronous generator.
11. Determination of efficiency of three phase alternator by loading with three phase induction motor.
12. Parallel operation of three-phase alternator under no-load and load conditions.
13. Determination of efficiency of a single-phase AC series Motor by conducting Brake test.

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Online Learning Resources:

1. https://em-coep.vlabs.ac.in/List%20of%20experiments.html

Course Outcomes:

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

1. Aanalyse the speed control methods on 3-phase Induction Motor.
2. Evaluate the performance of 3-phase Induction Motor by obtaining the locus diagram and equivalent circuit of 3-phase Induction Motor
3. Adapt the power factor improvement methods for single phase Induction Motor Pre-determine the regulation of 3-phase alternator
4. Determine the synchronous machine reactance of 3-phase alternator

Note :

Minimum 10 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations. In case if the student fails to get eligibility for semester end exams in the current semester, he/she has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted

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B.Tech – IV Semester **COURSE CODE:UR23PCEE412**

CONTROL SYSTEMS LAB

L	T	P	C
0	0	3	1.5

Internal Marks: 30
External Marks: 70

Course Objectives:

1. To impart hands on experience to understand the performance of basic control system components such as magnetic amplifiers, D.C. servo motors, A.C. Servo motors and Synchros.
2. To understand time and frequency responses of control systems with and without controllers and compensators.
3. To know the different logic gates and Boolean expressions using PLC.

List of Experiments

Any 10 experiments of the following are required to be conducted

1. Analysis of Second order system in time domain
2. Characteristics of Synchros
3. Effect of P, PD, PI, PID Controller on a second order systems
4. Design of Lag and lead compensation – Magnitude and phase plot
5. Transfer function of DC motor
6. Root locus, Bode Plot and Nyquist Plot for the transfer function of systems up to 5th orderusing MATLAB.
7. Kalman's test of Controllability and Observability using MAT LAB.
8. Temperature controller using PID
9. Characteristics of magnetic amplifiers
10. Characteristics of AC servo motor
11. Characteristics of DC servo motor
12. Study and verify the truth table of logic gates and simple Boolean expressions using PLC.

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Course Outcomes:

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

1. Analyze the performance of magnetic amplifier and DC and AC servo motors andsynchro
2. Design of PID controllers and compensators.
3. Evaluate temperature control of an oven using PID controller
4. Determine the transfer function of D.C Motor and examine the truth table of logicgates using PLC.
5. Judge the stability in time and frequency domain and Kalman's test for controllabilityand observability.

Note :

Minimum 10 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations. In case if the student fails to get eligibility for semester end exams in the current semester, he/she has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted

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B.Tech – IV Semester **COURSE CODE: UR23SEC413** **L T P C**

0 1 2 2

SKILL ENHANCEMENT COURSE: PYTHON PROGRAMMING LAB

Internal Marks: 30
External Marks: 70

Course Objectives:

The main objectives of the course are to

1. Introduce core programming concepts of Python programming language.
2. Demonstrate about Python data structures like Lists, Tuples, Sets and dictionaries
3. Implement Functions, Modules and Regular Expressions in Python Programming and to create practical and contemporary applications.

UNIT-I:

History of Python Programming Language, Thrust Areas of Python, Installing Anaconda Python Distribution, Installing and Using Jupiter Notebook.

Parts of Python Programming Language: Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, the type () Function and Is Operator, Dynamic and Strongly Typed Language.**Control Flow Statements**: if statement, if-else statement, if...elif...else, Nested statement, while Loop, for Loop, continue and break Statements, Catching Exceptions Using try and except Statement

Sample Experiments:

1. Write a program to find the largest element among three Numbers.
2. Write a Program to display all prime numbers within an interval
3. Write a program to swap two numbers without using a temporary variable.
4. Demonstrate the following Operators in Python with suitable examples.
   i) Arithmetic Operators ii) Relational Operators iii) Assignment Operators iv) Logical Operators v) Bit wise Operators vi) Ternary Operator vii) Membership Operators viii) Identity Operators
5. Write a program to add and multiply complex numbers
6. Write a program to print multiplication table of a given number.

UNIT-II: Functions: Built-In Functions, Commonly Used Modules, Function Definition and Calling the function, return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments

Sample Experiments:

1. Write a program to define a function with multiple return values.
2. Write a program to define a function using default arguments.

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3. Write a program to find the length of the string without using any library functions.
4. Write a program to check if the substring is present in a given string or not.
5. Write a program to perform the given operations on a list:
   i. addition ii. insertion iii. slicing
6. Write a program to perform any 5 built-in functions by taking any list.

UNIT-III:

Dictionaries: Creating Dictionary, Accessing and Modifying key:value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, del Statement.**Tuples and Sets:** Creating Tuples, Basic Tuple Operations, tuple() Function, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Relation between Tuples and Dictionaries, Using zip()Function, Sets, Set Methods.

Sample Experiments

7. Write a program to create tuples (name, age, address, college) for at least two members and concatenate the tuples and print the concatenated tuples.
8. Write a program to count the number of vowels in a string (No control flow allowed).
9. Write a program to check if a given key exists in a dictionary or not.
10. Write a program to add a new key-value pair to an existing dictionary.
11. Write a program to sum all the items in a given dictionary.

UNIT-IV:

Files: Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, Pickle Module, Reading and Writing CSV Files, Python os and os.path Modules.**Object-Oriented Programming:** Classes and Objects, Creating Classes in Python, Creating Objects in Python, Constructor Method, Classes with Multiple Objects, Class Attributes Vs Data Attributes, Encapsulation, Inheritance, Polymorphism.

Sample Experiments:

1. Write a program to sort words in a file and put them in another file. The output file should have only lower-case words, so any upper-case words from source must be lowered.
2. Python program to print each line of a file in reverse order.
3. Python program to compute the number of characters, words and lines in a file.
4. Write a program to create, display, append, insert and reverse the order of the items in the array.
5. Write a program to add, transpose and multiply two matrices.
6. Write a Python program to create a class that represents a shape. Include methods to calculate its area and perimeter. Implement subclasses for different shapes like circle, triangle, and square.

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B.Tech – IV Semester **COURSE CODE: UR23BS414**

L	T	P	C
1	0	2	2

DESIGN THINKING & INNOVATION

Internal Marks: 30
External Marks: 70

Course Objectives: The objectives of the course are to

1. Bring awareness on innovative design and new product development.
2. Explain the basics of design thinking.
3. Familiarize the role of reverse engineering in product development.
4. Train how to identify the needs of society and convert into demand.
5. Introduce product planning and product development process.

UNIT – I Introduction to Design Thinking:

Introduction to elements and principles of Design, basics of design-dot, line, shape, form as fundamental design components. Principles of design. Introduction to design thinking, history of Design Thinking, New materials in Industry.

UNIT - II Design Thinking Process:

Design thinking process (empathize, analyze, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking - person, costumer, journey map, brainstorming, product development

Activity: Every student presents their idea in three minutes, Every student can present design process in the form of flow diagram or flow chart etc. Every student should explain about product development.

UNIT-III Innovation:

Art of innovation, Difference between innovation and creativity and innovation in organizations. Creativity to Innovation. Teams of Innovation, Measuring the impact and value of creativity.

Activity: Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation.

UNIT – IV Product Design:

Problem formation, introduction to product design, Product Strategies, Product value, Product planning, product specifications. Innovation towards product design case studies.

Activity: Importance of modeling, how to set specifications, Explaining their own product design

UNIT – V Design Thinking in Business Process:

Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business - Business challenges: Growth, Predictability,

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UNIT-V:

Introduction to Data Science: Functional Programming, JSON and XML in Python, NumPy with Python, Pandas.

Sample Experiments:

1. Python program to check whether a JSON string contains complex object or not.
2. Python Program to demonstrate NumPy arrays creation using array () function.
3. Python program to demonstrate use of ndim, shape, size, dtype.
4. Python program to demonstrate basic slicing, integer and Boolean indexing.
5. Python program to find min, max, sum, cumulative sum of array
6. Create a dictionary with at least five keys and each key represent value
7. as a list where this list contains at least ten values and convert this dictionary as a pandas data frame and explore the data through the data frame as follows:
   a) Apply head () function to the pandas data frame
   b) Perform various data selection operations on Data Frame
8. Select any two columns from the above data frame, and observe the change in one attribute with respect to other attribute with scatter and plot operations in matplotlib

Reference Books:

1.Gowri shankar S, Veena A., Introduction to Python Programming, CRC Press.

2. Python Programming, S Sridhar, J Indumathi, V M Hariharan, 2nd Edition, Pearson, 2024

Online Learning Resources/Virtual Labs:

1. https://www.coursera.org/learn/python-for-applied-data-science-ai

Note 1:

Minimum 10 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations. In case if the student fails to get eligibility for semester end exams in the current semester, he/she has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted

Note 2:

Skill Oriented Course shall carry 100 marks and shall be evaluated through continuous assessments during the semester for 30 sessional marks and end examination shall be for 70 marks. Day-to-day work in the class / laboratory shall be evaluated for 30 marks by the concerned teacher based on the regularity/assignments/viva/mid semester test. The end examination similar to practical examination pattern shall be conducted by the concerned teacher and an expert in the subject nominated by the principal.

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Change, Relevance, Extreme competition, Standardization. Design thinking to meet corporate needs. Design thinking for Startups. Defining and testing Business Models and Business Cases. Developing & testing prototypes.
Activity: How to market our own product, about maintenance, Reliability and plan for startup.

Textbooks:

1. Tim Brown, Change by design, 1/e, Harper Bollins, 2009.

2. Idris Mootee, Design Thinking for Strategic Innovation, 1/e, Adams Media, 2014.

Reference Books:

1. David Lee, Design Thinking in the Classroom, Ulysses press, 2018.

2. Shrrutin N Shetty, Design the Future, 1/e, Norton Press, 2018

3. William lidwell, Kritinaholden, &Jill butter, Universal principles of design, 2/e, Rockport Publishers, 2010.

4. Chesbrough.H, The era of open innovation, 2003.

Online Learning Resources:

- https://nptel.ac.in/courses/110/106/110106124/
- https://nptel.ac.in/courses/109/104/109104109/
- https://swayam.gov.in/nd1_noc19_mg60/preview
- https://onlinecourses.nptel.ac.in/noc22_de16/preview

Course Outcomes: At the end of the course, the student will be able to

1. Define the concepts related to design thinking
2. Explain the fundamentals of Design Thinking and innovation.
3. Apply the design thinking techniques for solving problems in various sectors
4. Analyse to work in a multidisciplinary environment
5. Evaluate the value of creativity.

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