VASIREDDY VENKATADRI INSTITUTE OF TECHNOLOGY
(AUTONOMOUS)
Accredited by NBA (B.Tech program), Approved by AICTE, Permanently Affiliated to JNTUK,NAAC Accredited with 'A' Grade, ISO 9001:2015 Certified
Nambur (V), Pedakakani (M), Guntur (Dt.), Andhra Pradesh – 522 508,
www.vvitguntur.com

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING
SECOND YEAR COURSE STRUCTURE
(AUTONOMOUS)
R-23 Syllabus for EEE - VVIT w. e. f. 2023 - 2024
SEMESTER-IV

S.No.	Category	Course Name	L	T	P	Credits
1	Management Course - I	Managerial Economics and Financial Analysis	2	0	0	2
2	E S	Analog Circuits	3	0	0	3
3	PC	Electrical Power Generation	3	0	0	3
4	PC	Induction and Synchronous Machines	3	0	0	3
5	PC	Control Systems	3	0	0	3
6	PC	Control Systems Lab	0	0	3	1.5
7	PC	Induction and Synchronous Machines Lab	0	0	3	1.5
8	SEC	Python Programming	0	1	2	2
9	ES	Design Thinking & Innovation	1	0	2	2
10	LS	Life Skills-III	2	0	0	0
Total			**17**	**1**	**10**	**21**

II- Year II- Semester	Name of the Course	L	T	P	C
	Managerial Economics and Financial Analysis	2	0	0	2

BRANCH: EEE, CSE, IT and CSO Branches

PREREQUISITE: Basic Sciences and Humanities

Course Objectives:

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

Course Outcomes:

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

S.No	OUTCOME	Cognitive Levels as per Bloom's Taxonomy	Weightage (%)
CO1	Define the concepts related to Managerial Economics, financial accounting and management.	L1, L2, L3, L4	20
CO2	Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets and apply these concepts for effective business decision.	L1, L2, L3, L4	20

CO3	Understand the Nature of Competition, Characteristics of Pricing in the different market structure and know the different forms of Business organization.	L1, L2, L3, L4	20
CO4	Analyze how to invest their capital and maximize returns and evaluate the capital budgeting techniques.	L1, L2, L3, L4	20
CO5	Develop the accounting statements and evaluate the financial performance of business entity.	L1, L2, L3, L4	20

DETAILED SYLLABUS:

UNIT – I: Introduction to Managerial Economics

Definition of Managerial Economics and Scope – Managerial Economics with other subjects - Demand Concept, types, Law of Demand-Demand Elasticity- Types - Measurement. Demand Forecasting- Factors governing Forecasting, Methods.

UNIT – II: Production and Cost Analysis

Introduction - Production Function – Cobb-Douglas Production Function Least- cost combination - short run and long run Production Function- Isoquants and Isocosts, MRTS - - Laws of Returns - Internal and External Economies of scale.

Cost & Break-Even Analysis - Cost concepts- opportunity costs - Fixed costs, Variable Costs and Total costs - Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems)-Managerial significance and limitations of Break-Even Analysis.

UNIT – III: Introduction of Markets, Pricing Policies and Business Organizations

Introduction -meaning, Types of Markets -Perfect and Imperfect Competition - Features of Perfect Competition Monopoly- Monopolistic Competition - Oligopoly- Pricing Methods and Strategies.

Forms of Business Organizations-Sole Proprietary - Partnership - Joint Stock Companies - Public Sector Enterprises.

UNIT – IV: Capital Budgeting

Introduction - Types of Working Capital, Components, 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 - meaning, significance -Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). Financial Analysis - Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability.

Textbooks:

1. Aryasri: Business Economics and Financial Analysis, 1/e, MGH, 2020.
2. Aryasri: Managerial Economics and Financial Analysis, 4/e, MGH, 2019.
3. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2014.

Reference Books:

1. Ahuja Hl Managerial economics Schand,3/e,2013
2. S.A. Siddiqui and A.S. Siddiqui: Managerial Economics and Financial Analysis, New Age International, 2019.
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, 2013.

Online Learning Resources:

1. https://www.slideshare.net/123ps/managerial-economics-ppt
2. https://www.slideshare.net/rossanz/production-and-cost-45827016
3. https://www.slideshare.net/darkyla/business-organizations-19917607
4. https://www.slideshare.net/balarajbl/market-and-classification-of-market
5. https://www.slideshare.net/ruchi101/capital-budgeting-ppt-59565396
6. https://www.slideshare.net/ashu1983/financial-accounting

II- Year II- Semester	Name of the Course	L	T	P	C
	ANALOG CIRCUITS	**3**	**0**	**0**	**3**

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

Course objectives: The main objectives are

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

Unit – I:

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 Variations in V_{BE} and β for the Self-Bias Circuit, Bias Compensation, Thermal Runaway, 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 amplifiers.(*elementary treatment only)

Feedback Amplifiers: Classification of Amplifiers, the Feedback Concept, General Characteristics of Negative-Feedback Amplifiers, Effect of Negative Feedback upon Output and Input Resistances, Voltage-Series Feedback, Current-Series Feedback, Current-Shunt Feedback, Voltage-Shunt Feedback.

Unit – III:

Oscillator Circuits: Barkhausen Criterion of oscillation, Oscillator operation, R-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 (*elementary treatment only), 741 op-amp & its features.

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.

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Content Beyond the syllabus:--- Basics of biasing **FET** and **MOSFET; Active filter:** Butterworth, Sallen key**.**

Course Outcomes	
Upon successful completion of the course, the student will be able to	
CO1	**Analyze** diode clipping and clamping circuits. Understand different types of biasing circuits of a transistor **{Analyze level, KL4}**
CO2	**Apply** the small signal modelling for transistor circuit analysis and **illustrate** the operation of feedback amplifiers. **{Apply level, KL3}**
CO3	**Understand** the operation of oscillators, operational amplifier. **{Understand level, KL2}**
CO4	**Illustrate** the applications of op-amps, comparators and waveform generators **{Apply level, KL3}**
CO5	**Understand** the use of 555 timers in multi-vibrators, Schmitt Trigger, PLL applications and to know the operation of different ADC's and DAC's **{Understand level, KL2}**

Learning Resources
Text books:
1. Electronic Devices and Circuit Theory – Robert L.Boylestad and Louis Nashelsky, Pearson Edition, 2021 2. Linear Integrated Circuits – D. Roy Choudhury, New Age International (P) Ltd, 2nd Edition, 2003. 3. Electronic Devices and Circuits—J.B. Gupta , S K Kataria and sons publishers, 6th edition, 2013

Reference books:
1. Integrated Electronics- J. Millman, C.Halkias, Tata Mc-Graw Hill, 2nd Edition, 2013 2. Electronic Devices and Circuits–G.K. Mithal, Khanna Publisher, 23rd Edition, 2017 3. Electronic Devices and Circuits – David Bell, Oxford, 5thEdition, 2008. 4. Electronic Principles–Malvino, Albert Paul, and David J. Bates, McGraw-Hill/Higher Education, 2007. 5. Operational Amplifiers and Linear Integrated Circuits– Gayakwad R.A, Prentice Hall India, 2002.
e- Resources & other digital material
1. https://onlinecourses.nptel.ac.in/noc24_ee106/preview
2. https://archive.nptel.ac.in/courses/108/102/108102097/
3. https://www.youtube.com/watch?v=qRIhUkNeq04&list=PLs5_Rtf2P2r5MplAOADz3fTWIyBZTkGbB
4. https://archive.nptel.ac.in/courses/108/108/108108114/
5. https://archive.nptel.ac.in/courses/108/108/108108111/

II- Year II- Semester	Name of the Course	L	T	P	C
	Electrical Power Generation	**3**	**0**	**0**	**3**

Pre-requisite: Analysis of DC and AC Circuits.

Course objectives: The main objectives are

- To study principle of operation of different components of a hydro and thermal power stations.
- To study principle of operation of different components of a nuclear power stations.
- To study constructional and operation of different components of an Air and Gas Insulated substations.
- To study different types of cables and distribution systems.
- 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 breakers, main and transfer bus bar system with relevant diagrams.

Gas Insulated Substations (GIS) – advantages of gas insulated substations, constructional aspects of GIS, comparison of air insulated substations and gas insulated substations.

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 system, Design considerations in Distribution system.

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.

Content Beyond the syllabus:
Types of Conductors, Bundled Conductors.

Course Outcomes	
Upon successful completion of the course, the student will be able to	
CO1	Understand the different types of power plants and their Principle of operation. **{Understand level, KL2}**
CO2	Understand various Nuclear power plants and their Principle of operation. **{ Understand level, KL2}**
CO3	Describe the different components of air and gas insulated substations.

	{Analyze level, KL3}
CO4	Discuss the construction of single core and three core cables and describe distribution system configurations. **{Understand level, KL2}**
CO5	Analyse different economic factors of power generation and tariffs. **{Analyze level, KL3}**

Learning Resources
Text books:
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 System, S. Chand, 4th Edition, 2005. 4. Turan Gonen, Electric Power Distribution System Engineering, McGraw-Hill, 1985. 5. Handbook of switchgear, BHEL, McGraw-Hill Education, 2007.
e- Resources & other digital material
6. https://nptel.ac.in/courses/108102047
7. https://nptel.ac.in/courses/108104191

II- Year (II&II) Semester	Name of the Course	L	T	P	C
	INDUCTION AND SYNCHRONOUS MACHINES	3	0	0	3

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

Course Objectives:

Students will get exposure to

- characteristics, starting and testing methods of Induction Motor
- Torque production and performance of Induction Motor.
- In determining the performance parameters of Induction Motor.
- working of synchronous machines

Syllabus		
DC MACHINES & TRANSFORMERS		
Unit No	**Contents**	**Mapped CO**
I	**3-phase induction motors (12 Hours)** Construction of Squirrel cage and Slip ring 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.	**CO1**
II	**Performance of 3-Phase induction motors (15 Hours)** Torque equation – expressions for maximum torque and starting torque – torque-slip characteristics–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.	**CO2**
III	**Single Phase Motors (10 Hours)** 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.	**CO3**
IV	**Synchronous Generator (15 Hours)** Constructional features of non-salient and salient pole type alternators- armature windings – distributed and concentrated windings – distribution& pitch factors – E.M.F	**CO4**

	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 alternators.	
V	**Synchronous Motor (10 Hours)** 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.	**CO4**
Content Beyond the syllabus: V & Inverted V curves of synchronous motor.		

Course Outcomes	
Upon successful completion of the course, the student will be able to	
CO1	Understand the construction and operation of three-phase induction motor.(**Understand**)
CO2	Analyse the performance of three-phase induction motor. (**Analyze**)
CO3	Describe the working of single-phase induction motors. (**Describe**)
CO4	Analyze the performance of Synchronous generators and motors.(**Analyze**)

Text books:

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

Reference books

1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Mc Graw Hill, 2019, Fourth Edition
2. Principles of Power Systems, V.K. Mehtha, S.Chand Technical Publishers, 2020
3. Basic Electrical Engineering, T. K. Nagsarkar and M. S. Sukhija, Oxford University Press, 2017
4. Basic Electrical and Electronics Engineering, S. K. Bhatacharya, Person Publications, 2018, Second Edition.
5. R. S. Sedha, A Textbook of Electronic Devices and Circuits, S. Chand & Co, 2010.
6. SantiramKal, Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India, 2002.
7. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education,2009.

e- Resources & other digital material

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

II- Year II- Semester	Name of the Course	L	T	P	C
	CONTROL SYSTEMS	**3**	**0**	**0**	**3**

PREREQUISITE: Laplace Transforms, Differential equations, Matrix Algebra, Basic Circuit Analysis

COURSE OBJECTIVE:

- To learn the mathematical modelling of physical systems and to use block diagram algebra and signal flow graph to determine overall transfer function
- To analyze the time response of first and second order systems and improvement of performance using P, PI, PD and PID controllers
- To investigate the stability of closed loop systems using Routh's stability criterion and root locus method
- To learn Frequency Response approaches for the analysis of LTI systems using Bode plots, polar plots and Nyquist stability criterion.
- To learn state space approach for analysis of LTI systems and understand the concepts of controllability and observability

UNIT-1: Mathematical Modelling of Control Systems

Introduction to control systems, Classifications - Open Loop and closed loop, transfer function, Mathematical Modelling of electrical networks, Translational and Rotational systems, analogous systems, Transfer Function of DC & AC Servo motor- Synchros, Block diagram algebra–Signal flow graph-Mason's gain formula

UNIT-II: Time Response Analysis:

Standard test signals-Time response of first and second order systems- Time domain specifications – Steady state errors and error constants – Effects of Feedback-Dominant Closed loop poles- P-PD-PI-PID controllers

UNIT-III: Stability and Root locus Technique:

The concept of stability - Routh's stability criterion, Procedure and problems– limitations of Routh's stability–Root locus concept-construction of root loci –Effect of Adding open loop poles and Zeros on Root Locus

UNIT-IV: Frequency Response Analysis:

Introduction - Frequency domain specifications- Bode diagrams- transfer function from the Bode Diagram-Polar Plots, Nyquist Stability criterion relative stability analysis-Phase margin and Gain margin- Lag, Lead and Lag- Lead compensator

UNIT-V: State Space Analysis:

Concepts of state, state variables, state equation and state model, state space modelling of control systems, Solution of the state equation-State Transition Matrix and its Properties-Transfer function from state models, Tests for controllability and observability.

TEXTBOOKS:

1. "Control Systems Engineering" by I.J.Nagarath and M.Gopal, 5thEdition , New age International Publications.

2. "Automatic control systems" by Benjamin C.Kuo, 2ndEdition, Prentice Hall of India.

REFERENCEBOOKS:

1. "Control Systems principles and design" by M.Gopal,4thEdition , Tata McGraw Hill education PvtLtd.

2. "Modern Control Engineering" by Kotsuhiko Ogata, Prentice Hall of India.

3. "Control Systems" by Manik Dhanesh N, Cengage publications.

4. "Control Systems Engineering" by S.Palani, Tata Mc Graw Hill Publications.

ONLINE REFERENCES:

1. https://nptel.ac.in/noc/courses/noc20/SEM2/noc20-ee84/

2. https://nptel.ac.in/noc/courses/noc18/SEM2/noc18-ee25/

3. https://nptel.ac.in/noc/courses/noc19/SEM2/noc19-ee45

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COURSE OUTCOMES: Students will be able:

Course Outcomes	
Upon successful completion of the course, the student will be able to	
CO1	To derive the transfer function using block diagram algebra and signal flow graph **{Apply level, KL2}**
CO2	To Determine time response specifications of second order systems and Error constants. **{Evaluate level, KL3}**
CO3	To analyze stability using Routh's stability criterion and the root locus method **{Analyze level, KL3}**
CO4	To analyze the stability using Bode plot and Nyquist criterion **{Understand level, KL3}**
CO5	To obtain the state models and understanding the concepts of controllability and observability

	{Analyze level, KL3}

Learning Resources
Text books:
1. "Control Systems Engineering" by I.J.Nagarath and M.Gopal, 5thEdition , New age International Publications. Fundamentals of Electric Circuits, Charles K. Alexander, Mathew N. O. Sadiku, 3rd Edition, Tata McGraw-Hill, 2019 2. "Automatic control systems" by Benjamin C.Kuo, 2ndEdition, PHI
Reference books:
1. "Control Systems principles and design" by M.Gopal,4thEdition , Tata McGraw Hill education PvtLtd. 2. "Modern Control Engineering" by Kotsuhiko Ogata, Prentice Hall of India. 3. "Control Systems" by Manik Dhanesh N, Cengage publications. 4. "Control Systems Engineering" by S.Palani, Tata Mc Graw Hill Publications. 6.
e- Resources & other digital material
1. https://nptel.ac.in/noc/courses/noc20/SEM2/noc20-ee84/
2. https://nptel.ac.in/noc/courses/noc18/SEM2/noc18-ee25/

II- Year II- Semester	Name of the Course	L	T	P	C
	Control Systems Lab	0	0	3	1.5

Course Objectives:

- To impart hands on experience to understand the performance of basic control system components such as magnetic amplifiers, D.C servo motors and Synchros.
- To understand time and frequency responses of control system with and without controllers and compensators.

Any 10 of the following experiments are to be conducted:

1. Time response of Second order system
2. Characteristics of Synchros
3. Effect of P, PD, PI, PID Controller on a second order systems
4. Study of Lag and lead compensation – Magnitude and phase plot
5. Effect of feedback on DC servomotor
6. Bode Plot, Root locus, Nyquist Plots for the transfer functions of systems up to 5^{th} order using MATLAB
7. Potentiometer as error detector
8. Temperature controller using PID
9. Characteristics of magnetic amplifiers
10. Characteristics of DC servo motor
11. State model using MATLAB

Course Outcomes:

After the completion of the course the student should be:

CO1: Able to analyze the time response of a second order system.

CO2: Able to analyze the effect of P, PI,PD, PID controllers and Lag, Lead compensators.

CO3: Able to analyze the performance and working of magnetic amplifier and synchros.

CO4: Able to judge the stability in time and frequency domain.

CO5: Able to analyze the performance and working of DC servomotor.

II- Year (II&II) Semester	Name of the Lab Course	L	T	P	C
	Induction And Synchronous Machines Lab	0	0	3	1.5

Course Objectives:

The objectives of this course is

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

List of Experiments

Any 10 of the following experiments are 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 method.
8. Regulation of a three -phase alternator by MMF method.
9. Regulation of three-phase alternator by Potier triangle method.
10. V and Inverted V curves of a three-phase synchronous motor.
11. Determination of X_d, X_q& Regulation of a salient pole synchronous generator.
12. Determination of efficiency of three phase alternator by loading with three phase induction motor.
13. Parallel operation of three-phase alternator under no-load and load conditions.
14. Determination of efficiency of a single-phase AC series Motor by conducting Brake test.

Course Outcomes	
Upon successful completion of the course, the student will be able to	
CO1	Demonstrate the speed control methods on 3-phase Induction Motor. (KL 4)
CO2	Evaluate the performance of 3-phase Induction Motor by obtaining the locus diagram and equivalent circuit of 3-phase Induction Motor.(KL 5)

CO3	Adapt the power factor improvement methods for single phase Induction Motor (KL 3)
CO4	Determine the regulation of 3-phase alternator.(KL 3)
CO5	Determine the synchronous machine reactance of 3-phase alternator (KL 3)

II- Year II- Semester	Name of the Course	L	T	P	C
	Python Programming Lab **(Skill Enhancement course)**	0	1	2	2

Prerequisites: Basic Mathematics.

Course Objectives:

- To introduce the foundational concepts of Python programming.
- To develop an understanding of Python functions, strings, and lists, and their applications.
- To familiarize students with the use of dictionaries, tuples, and sets in Python.
- To provide hands-on experience in handling file operations and understanding object-oriented programming concepts.
- To equip students with the skills to use Python for data science tasks.

Syllabus		
Unit No	**Contents**	**Mapped CO**
I	History of Python Programming Language, Thrust Areas of Python, Installing Anaconda Python Distribution, Installing and Using Jupyter 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 if statement, while Loop, for Loop, continue and break Statements, Catching Exceptions Using try and except Statement.	**CO1**
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. **Strings:** Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings. **Lists:** Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, del Statement.	**CO2**

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 Lists, Relation between Tuples and Dictionaries, Using zip() Function, Sets, Set Methods, Frozenset.	**CO3**
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.	**CO4**
V	**Introduction to Data Science:** Functional Programming, JSON and XML in Python, NumPy with Python, Pandas.	**CO5**

List of Experiments:

1. Write a program that asks the user for a weight in kilograms and converts it to pounds. There are 2.2 pounds in a kilogram.
2. Write a program that asks the user to enter three numbers (use three separate input statements). Create variables called total and average that hold the sum and average of the three numbers and print out the values of total and average.
3. Write a function called *sum_digits* that is given an integer num and returns the sum of the digits of num.
4. Write a function called *is_sorted* that is given a list and returns True if the list is sorted and False otherwise
5. Write a program to create tuples (name, age, address, college) for at least two members and concatenate the tuples and print the concatenated tuples.
6. Write a program to check if a given key exists in a dictionary or not.
7. Write a Python class to implement pow(x, n).
8. Write a Python class to reverse a string word by word.
9. Python Program to demonstrate NumPy arrays creation using array () function.
10. Python program to demonstrate use of ndim, shape, size, dtype.
11. Write a program to print multiplication table of a given number.
12. Write a program to perform the given operations on a list: i.addition ii.insertion iii. slicing
13. Write a program to add a new key-value pair to an existing dictionary.
14. Write a program to add, transpose and multiply two matrices.

15. Python program to demonstrate basic slicing, integer and Boolean indexing.

Course Outcomes	
Upon successful completion of the course, the student will be able to	
CO1	**Understand** the foundational concepts of Python programming. (L2)
CO2	**Apply** Python programming concepts such as functions, strings, and lists, along with their methods to solve basic programming problems**.** (L3)
CO3	**Apply** the concepts of dictionaries, tuples, and sets in Python.(L3)
CO4	**Incorporate** file operations, work with various file types, and implement object-oriented programming concepts. (L3)
CO5	**Analyze** Data using Numpy and Pandas libraries in Python for data science tasks. (L4)
Learning Resources	
Text 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	
Reference Books	
1. Introduction to Programming Using Python, Y. Daniel Liang, Pearson.	
e- Resources & other digital material	
https://onlinecourses.nptel.ac.in/noc21_cs32/preview https://www.youtube.com/watch?v=qiR6ePI5u0w&list=PLDVrhnY7hFVoA0N5NhRA9lPur5dxXBujy https://www.coursera.org/learn/python?specialization=python#syllabus	

II- Year II- Semester	Name of the Course	L	T	P	C
	DESIGN THINKING & INNOVATION	**1**	**0**	**2**	**2**

Pre-requisite: Electrical Circuits, Basics of IOT and basic idea about renewable energy sources.

Course Objectives: The objective of this course is to familiarize students with design thinking process as a tool for breakthrough innovation. It aims to equip students with design thinking skills and ignite the minds to create innovative ideas, develop solutions for real-time problems. The main objectives are

- To define the concepts related to design thinking and explain the fundamentals of Design Thinking and innovation
- To apply the design thinking techniques for solving problems in various sectors.
- To analyse to work in a multidisciplinary environment
- To evaluate the value of creativity
- To formulate specific problem statements of real time issues

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, role of creativity and innovation in organizations. Creativity to Innovation. Teams for 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 modelling, how to set specifications, Explaining their own product design.

UNIT – V

Design Thinking in Business Processes

Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business – Business challenges: Growth, Predictability, Change, Maintaining 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 start-up.

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Course Outcomes	
Upon successful completion of the course, the student will be able to	
CO1	Define the concepts related to design thinking and explain the fundamentals of Design Thinking and innovation **{Remember & Apply level, KL2}**
CO2	Apply the design thinking techniques for solving problems in various sectors. **{Apply level, KL3**
CO3	Analyse to work in a multidisciplinary environment **{Analyze level, KL3}**
CO4	Evaluate the value of creativity **{Evaluate level, KL3}**
CO5	Formulate specific problem statements of real time issues.**{Apply level, KL3}**

Learning Resources
Text books:
1. Change by design, Tim Brown, Harper Bollins (2009) 2. Design Thinking for Strategic Innovation, Idris Mootee, 2013, John Wiley & Sons.
Reference books:
1. Design Thinking in the Classroom by David Lee, Ulysses press 2. Design the Future, by Shrrutin N Shetty, Norton Press 3. Universal principles of design- William lidwell, kritinaholden, Jill butter. 4. The era of open innovation – chesbrough.H
e- Resources & other digital material
1. https://nptel.ac.in/courses/110/106/110106124/
2. https://nptel.ac.in/courses/109/104/109104109/
3. https://swayam.gov.in/nd1_noc19_mg60/preview

VVIT VASIREDDY VENKATADRI INSTITUTE OF TECHNOLOGY	**VASIREDDY VENKATADRI INSTITUTE OF TECHNOLOGY :: NAMBUR**
	Course: Life skills-IV **II B. Tech II Semester AY 2024-25**

The Life Skills course is divided into three components – Part-A. Quantitative Ability, Part-B. Reasoning Ability and Part-C. Verbal Ability.

Part-A: Quantitative Ability: Almost all competitive examinations test the candidate for quantitative aptitude, especially recruitment test, public service examinations management courses, where they evaluate the student's thinking prowess and analytical skills. Critical analysis of problems asked in examination reveal that they are designed to correlate multiple topics and the test taker is expected to identify those link points and come out with an out-of-box unique solution. The purpose of the test is to assess the arithmetic abilities, logical, analysis, problem solving and decision-making skills.

Part-B: Reasoning Ability: Reasoning ability is the ability to draw connections between factors, and the ability to synthesize a message from a body of information. Reasoning ability of the aspirants for jobs or courses is tested by means of a verbal reasoning test non-verbal reasoning. Thus, reasoning is a highly specialized thinking which helps an individual to explore mentally the cause & effect relationship of an event or solution of a problem by adopting some well-organized systematic steps based on previous experience combined with present observation. Most of the recruitment tests consist of questions to assess the reasoning ability of the students.

Part-C: Verbal Ability:

Prerequisite: Learnability Quotient (LQ)

Course Outcomes: After completion of the course the student will be able to:

CO 1	Calculating, applying and estimating time, speed and distance in boats, streams, races and games.
CO 2	Implementing mean, median and mode in day-to-day application.
CO 3	Enhance the logical abilities to find out deductions of statements (logical) and connectives of statements through various methodologies.
CO 4	Improve the abilities problem solving skills and to solve relationship of letters and numbers using arithmetical operations
CO 5	Able to frame impactful sentences thereby enhancing potential language proficiency
CO 6	Develop competencies that are essential to address sustainable development challenges

Part-A: Quantitative Ability

Unit-1: - Module 1: Races and Games

Module 2: Geometry and Mensuration

Unit-2: - Module 3: Sequences

Module 4: Statistics

Part-B: Reasoning Ability

Unit-3: - Module 5: Syllogisms
Module 6: Logical Connectives

Unit-4: - Module 7: Cubes and Dice
Module 8: Crypto Arithmetic

Part-C: Verbal Ability

Unit-5: - Module 9: Conflict Management
Social Responsibility/Sustainable Development
Creative Thinking
Module 10: Cloze test
Correction of Errors
Ordering of Words

Unit-6: - Module 11: e-mail Writing
Oral Presentations
PowerPoint Presentations
Module 12: Ethical Approach to Technology
Adaptability
Empathy

Reference Books

1. Quantitative Aptitude for Competitive Examination by Dr R S Agarwal
2. Fast Track Objective Arithmetic Paperback – 2018 by Rajesh Verma
3. Teach Yourself Quantitative Aptitude, by Arun Sharma
4. The Pearson Guide to Quantitative Aptitude for Competitive Examination by Dinesh Khattar
5. Quantitative Aptitude for all Competitive Exam by Abhijit Gupta
6. Quantitative Aptitude Quantum CAT by Sarvesh K. Verma
7. Reasoning Ability for Competitive Examination by Dr R S Agarwal
8. A Modern Approach to Logical Reasoning (2019-20 Session) by R.S. Aggarwal [S. Chand]
9. How to Prepare for Logical Reasoning for CAT by Arun Sharma [McGraw Hill]
10. Multidimensional Reasoning by Mishra and Kumar Dr. Lal [Upkar's]
11. A Modern Approach to Verbal & Non-Verbal Reasoning (2019-20 Session) by R.S. Aggarwal [S. Chand]
12. A New Approach to Reasoning Verbal & Non-Verbal by B.S. Sijwali and Indu Sijwali [Arihant]
13. Analytical Reasoning (2018-2019) Session by MK Panday
14. How to Crack Test Of Reasoning by Jaikishan and Premkishan [Arihant]
15. Logical Reasoning and Data Interpretation for CAT & other MBA exams by K. Sinha Nishit [Pearson]
16. Reasoning for Competitive Exams by K. Sinha Nishit [Pearson]
17. Shortcuts in Reasoning (Verbal, Non-Verbal, Analytical & Critical) for Competitive Exams by Disha Experts
18. Visual Intelligence for Beginners by Matthew Alcot
19. Logical Reasoning & Data Interpretation by Nishit K. Sinha
20. McCarthy, Michael& Felicity O'Dell. English Vocabulary in Use beginner, Cambridge

University Press, 2017.
21. McCarthy, Michael & Felicity O'Dell. English Vocabulary in Use Upper-Intermediate, Cambridge University Press, 2017.
22. McCarthy, Michael & Felicity O'Dell. English Vocabulary in Use Advanced, Cambridge University Press, 2017.
23. Sonmez, John. Soft Skills: The Software Developer's Life, Manning Publications, 2014.
24. Tulgan, Bruce. Bridging the Soft Skills Gap: How to Teach the Missing Basics to Today's Young Talent, Pan Macmillan India, 2016.

Module Coordinator **BOS** **HOD**