SRI VASAVI ENGINEERING COLLEGE

(AUTONOMOUS)

(Sponsored by Sri Vasavi Educational Society)

(Approved by AICTE, New Delhi &Recognized by UGC under section 2(f) & 12(B))

(Permanently affiliated to JNTUK, Kakinada, Accredited by NBA and NAAC with 'A' Grade)

Pedatadepalli, **TADEPALLIGUDEM–534 101.**W.G.Dist**. (A.P)**

Department of Electrical & Electronics Engineering (NBA Accredited)

Dt: 25.07.2024

The seventh meeting of Board of Studies in Department of Electrical and Electronics Engineering was held at 12.00 PM on 23-07-2024 through online mode using Zoom meetings.

The following members are attended the meeting.

S. No.	Name	Designation	Role
1.	Dr. Sudha Rani Donepudi	Professor, Head, Dept. of EEE, SVEC, Pedatadepalli.	Chairperson
2.	Dr. R. SrinivasaRao	Professor, Dept. of EEE, UCEK, JNTUK, Kakinada	Subject Expert Nominated By V.C.
3.	Dr. M. Sydulu	Professor, Dept. of EEE, NITW, Warangal	Subject Expert Nominated By V.C.
4.	Dr. Y.P. Obulesu	Professor, School of EE, VIT, Vellore	Subject Expert Nominated By A.C.
5.	Er. B.N.V.R.C. Suresh Kumar	Retired AGM, PGCI, Hyderabad	Industry Expert Nominated By A.C
6.	Dr. Ch. Rambabu	Professor	Member
7.	Dr. Anilkumar Chappa	Associate Professor	Member
8.	Mr. U. Chandra Rao	Sr. Asst. Professor	Member
9.	Mr. N. Sri Harish	Sr. Asst. Professor	Member
10.	Mr. Ch. V.S.R. Gopala Krishna	Sr. Asst. Professor	Member
11.	Mr. K. Ramesh Babu	Sr. Asst. Professor	Member
12.	Mr. K. Suresh	Asst. Professor	Member
13.	Mr. M.T.V.L. Ravi Kumar	Asst. Professor	Member
14.	Mr. G. Madhu Sagar Babu	Asst. Professor	Member
15.	Mr. A. Uma Siva Naga Prasad	Asst. Professor	Member
16.	Dr. E. Naga Venkata Durga Vara Prasad	Asst. Professor	Member
17.	Dr. D. J. Krishna Kishore	Asst. Professor	Member

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The following are the minutes of the meeting

Item No. 1: Welcome note by the Chairperson BOS

The HOD extended a formal welcome and introduced the members.

Item No. 2: Approval of course structure for III to IV Semesters of B. Tech EEE under V23 Regulation.

Approved the course structure of III to IV Semesters of B. Tech Programme –EEE under V23 Regulation.

The details of the approved course structure for III to IV Semesters of UG (B. Tech) Programme (EEE) under V23 Regulation are given in Annexure-I.

Item No. 3: Approval of syllabi for the courses offered in III to IV Semesters B. Tech EEE under V23 Regulation.

Approved the syllabi for the courses offered in III to IV Semesters B. Tech EEE under V23 Regulation.

The approved syllabi for the courses offered in III to IV Semesters of B. Tech EEE under V23 Regulation is attached in Annexure-II.

CHAIRPERSON OF BOS
DR. SUDHA RANI DONEPUDI

Annexure I

Course structure Approved in Previous BOS Meetings

Course Structure of Electrical and Electronics Engineering – V23 Regulation

I Semester						
S.No	**Course Code**	**Name of the Course**	**L**	**T**	**P**	**Credits**
1	V23ENT01	Communicative English	2	0	0	2
2	V23PHT01	Physics	3	0	0	3
3	V23MAT01	Linear Algebra & Calculus	3	0	0	3
4	V23EET01	Basic Electrical & Electronics Engineering	3	0	0	3
5	V23CST01	Introduction to Programming	3	0	0	3
6	V23ENL01	Communicative English Lab	0	0	2	1
7	V23PHL01	Physics Lab	0	0	2	1
8	V23EEL01	Electrical & Electronics Engineering Workshop	0	0	3	1.5
9	V23CSL01	Computer Programming Lab	0	0	3	1.5
10	V23SPT02	Health and wellness, Yoga and Sports	-	-	1	0.5
Total Contact Hours			**14**	**0**	**11**	**19.5**

II Semester						
S.No	**Course Code**	**Name of the Course**	**L**	**T**	**P**	**Credits**
1	V23MAT02	Differential Equations & Vector Calculus	3	0	0	3
2	V23CHT01	Engineering Chemistry	3	0	0	3
3	V23CMT01	Basic Civil & Mechanical Engineering	3	0	0	3
4	V23EET02	Electrical Circuit Analysis – I	3	0	0	3
5	V23MET01	Engineering Graphics	2	0	2	3
6	V23CSL02	IT Workshop	0	0	2	1
7	V23MEL01	Engineering Workshop	0	0	3	1.5
8	V23CHL01	Engineering Chemistry Lab	0	0	2	1
9	V23EEL02	Electrical Circuit Analysis & Simulation Lab	0	0	3	1.5
10	V23SPTO1	NSS/NCC/SCOUTS & Guides/Community Services	-	-	1	0.5
Total Contact Hours			**14**	**0**	**13**	**20.5**

III Semester							
S.No	**Course Code**	**Category**	**Name of the Course**	**L**	**T**	**P**	**Credits**
1.	V23MAT04	BS	Transform Techniques & Numerical Methods	3	0	0	3
2.	V23MBT53	HSMC	Universal Human Values-Understanding Harmony Ethical Human Conduct	2	1	0	3
3.	V23EET03	Engineering Science	Electromagnetic Field Theory	3	0	0	3
4.	V23EET04	Professional Core	Electrical Circuit Analysis-II	3	0	0	3
5.	V23EET05	Professional Core	DC Machines & Transformers	3	0	0	3
6.	V23EEL03	Professional Core	Electrical Circuit Analysis-II and Simulation Lab	0	0	3	1.5
7.	V23EEL04	Professional Core	DC Machines & Transformers Lab	0	0	3	1.5
8.	V23CSSE12	Skill Enhancement Course	Data Structures Lab	0	1	2	2
9.	V23CEAC01	Audit Course	Environmental Science	2	0	0	-
			Total Contact Hours	**15**	**2**	**10**	**20**

IV Semester							
S.No.	**Course Code**	**Category**	**Name of the Course**	**L**	**T**	**P**	**Credits**
1.	V23MBT51	Management Course-I	Managerial Economics & Financial Analysis	2	0	0	2
2.	V23ECT09	Engineering Science	Analog Circuits	3	0	0	3
3.	V23EET06	Professional Core	Power Systems-I	3	0	0	3
4.	V23EET07	Professional Core	Induction and Synchronous Machines	3	0	0	3
5.	V23EET08	Professional Core	Control Systems	3	0	0	3
6.	V23EEL05	Professional Core	Induction and Synchronous Machines Lab	0	0	3	1.5
7.	V23EEL06	Professional Core	Control Systems Lab	0	0	3	1.5
8.	V23CSSE01	Skill Enhancement course	Python Programming Lab	0	1	2	2
9.	V23MET09	Engineering Science	Design Thinking & Innovation	1	0	2	2
			Total Contact Hours	**15**	**1**	**10**	**21**
Mandatory Community Service Project Internship of 08 weeks duration during Summer Vacation							

Annexure II

Syllabi for the Courses offered in III & IV Semesters B. Tech under V23 Regulation

Semester	III SEM	L	T	P	C	COURSE CODE
Regulation	V23	3	0	0	3	V23EET03
Name of the Course	Electromagnetic Field Theory					
Branches	EEE					

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
1	Compute electric fields and potentials using Gauss law/ solve Laplace's or Poisson's equations for various electric charge distributions.	K3
2	Analyse the behaviour of conductors in electric fields, electric diploe and the capacitance and energy stored in dielectrics.	K4
3	Calculate the magnetic field intensity due to current carrying conductor and Understanding the application of Ampere's law, Maxwell's second and third law.	K4
4	Estimate self and mutual inductances and the energy stored in the magnetic field.	K2
5	Understand the concepts of Faraday's laws, Displacement current, Poynting theorem and Poynting vector.	K2

UNIT - I

Electrostatics:

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

UNIT - II

Conductors – Dielectrics and Capacitance:

Behaviour of conductor in Electric field, Electric dipole and dipole moment – Potential and EFI due to an electric dipole, Torque on an Electric dipole placed in an electric field, Current density-conduction and convection current densities, Ohm's law in point form, Behaviour of conductors in an electric field, Polarization, dielectric constant and strength, Continuity equation and relaxation time, Boundary conditions between conductor to dielectric, dielectric to dielectric and conductor to free space, Capacitance of parallel plate, coaxial and spherical capacitors, Energy stored and density in a static electric field.

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 – Magnetic flux density and Maxwell's second Equation ($\nabla.\vec{B} = 0$), Ampere's circuital law and its applications viz. MFI due to an infinite sheet, long filament, solenoid, toroidal current carrying conductor, point form of Ampere's circuital law, Maxwell's third equation ($\nabla \times \vec{H} = \vec{j}$).

Magnetic force, moving charges in a magnetic field – Lorentz force equation, force on a 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 and parallel current carrying conductors, Magnetic dipole, Magnetic torque, and moment.

UNIT - IV

Self and mutual inductance:

Self and mutual inductance – determination of self-inductance of a solenoid, toroid, coaxial 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

Time Varying Fields:

Faraday's laws of electromagnetic induction, Maxwell's fourth equation $\left(\nabla \times \vec{E} = -\frac{\partial \vec{B}}{\partial t}\right)$, integral and point forms of Maxwell's equations, statically and dynamically induced EMF, Displacement current, Modification of Maxwell's equations for time varying fields, Poynting theorem and Poynting vector.

Textbooks:

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

Reference Books:

1. "Introduction to Electro Dynamics" by D J Griffiths, Prentice-Hall of India Pvt. Ltd, 2nd edition.
2. "Electromagnetic Field Theory" by Yaduvir Singh, Pearson India, 1st edition, 2011.
3. "Fundamentals of Engineering Electromagnetics" by Sunil Bhooshan, Oxford University Press, 2012.
4. Schaum's Outline of Electromagnetics by Joseph A. Edminister, MahamoodNavi,4th Edition,2014.

Online Learning Resources:

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

Semester	III SEM	L	T	P	C	COURSE CODE
Regulation	V23	3	0	0	3	V23EET04
Name of the Course	Electrical Circuit Analysis-II					
Branches	EEE					

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
1	Analyse the balanced and unbalanced 3 phase circuits for power calculations.	K4
2	Analyse the transient behaviour of electrical networks in different domains.	K4
3	Estimate various Network parameters.	K2
4	Apply the concept of Fourier series to electrical systems.	K3
5	Analyse the filter circuit for electrical circuits.	K4

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, 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

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

Filters: Classification of filters-Low pass, High pass, Band pass and Band Elimination filters, Constant-k filters -Low pass and High Pass, Design of Filters.

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/

Semester	III SEM	L	T	P	C	COURSE CODE
Regulation	V23	3	0	0	3	V23EET05
Name of the Course	DC Machines & Transformers					
Branches	EEE					

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand the working principle, construction and operation of DC generator.	K1
CO2	Illustrate characteristics of DC motors, necessity of starter and pre-determined efficiency of DC motor.	K3
CO3	Analyze construction, working principle and equivalent circuit of 1-Φ transformer.	K4
CO4	Describe different tests of -Φ transformer.	K2
CO5	Explain different connections of 3-Φ transformer their parallel operation and transient on/off conditions.	K2

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 Motors

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.

Textbooks:

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. Electrical Machines by D. P.Kothari, I .J .Nagarth, McGraw Hill Publications, 5th edition
2. Electrical Machinery Fundamentals by Stephen J Chapman McGraw Hill education 2011.
3. Generalized Theory of Electrical Machines by Dr. P S Bimbhra, 7th Edition, Khanna Publishers, 2021.
4. Theory & Performance of Electrical Machines by J.B.Gupta, S.K.Kataria& Sons,2007.
5. Electric Machinery by Fitzgerald, A.E.,Kingsley, Jr.,C.,& Umans, S. D, 7th edition, McGraw-Hill Education, 2014.

Online Learning Resources:

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

Semester	III SEM	L	T	P	C	COURSE CODE
Regulation	V23	0	0	3	1.5	V23EEL03
Name of the Course	Electrical Circuit Analysis-II And Simulation Lab					
Branches	EEE					

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Determine the power in three – phase circuits.	K4
CO2	Evaluate two port network parameters.	K5
CO3	Analyse and simulate electrical circuits using suitable software.	K4
CO4	Analyse and simulate the resonant circuits using simulation tools.	K4
CO5	Evaluate the time response of given network.	K5

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 parameters
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. Determination of self-inductance and mutual inductance by using simulation tools.

Semester	III SEM	L	T	P	C	COURSE CODE
Regulation	V23	0	0	3	1.5	V23EEL04
Name of the Course	Dc Machines & Transformers Lab					
Branches	EEE					

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Demonstrate starting and speed control methods of DC Machines.	K3
CO2	Determine the performance characteristics of DC machines by direct and indirect testing methods.	K4
CO3	Determine the performance parameters of single - phage transformer.	K4
CO4	Demonstrate 3-Φ to 2- Φ conversion by scott connection.	K3
CO5	Demonstrate parallel operation, separation of losses in a 1-Φ transformer	K3

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 teston 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. Parallel operation of Three-phase Transformers.
14. Separation of core losses of a single-phase transformer.

Online Learning Resources:

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

Semester	IV SEM	L	T	P	C	COURSE CODE
Regulation	V23	3	0	0	3	V23EET06
Name of the Course	Power Systems-I					
Branches	EEE					

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand the layout, components, operation of hydroelectric and thermal power stations.	K2
CO2	Understand the layout, components and operation of nuclear power station.	K2
CO3	Describe the different components of air and gas insulated substations.	K2
CO	Discuss the construction of single core and three core cables and describe distribution system configurations.	K2
CO5	Analyse different economic factors of power generation and tariffs.	K4

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, requirements of a 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.

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.

Online Learning Resources:

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

Semester	IV SEM	L	T	P	C	COURSE CODE
Regulation	V23	3	0	0	3	V23EET07
Name of the Course	Induction and Synchronous Machines					
Branches	EEE					

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Explain the construction and operation of three -phase induction motor.	K2
CO2	Analyse the performance of three-phase induction motor.	K4
CO3	Describe the working and constructional features of single-phase induction motors.	K2
CO4	Analyse working, construction and performance of Synchronous generators.	K4
CO5	Explain working, construction and starting methods of synchronous motors.	K2

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–IV:

Synchronous Generator:

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 alternators.

UNIT–V:

Synchronous Motor:

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.

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

Semester	IV SEM	L	T	P	C	COURSE CODE
Regulation	V23	3	0	0	3	V23EET08
Name of the Course	Control Systems					
Branches	EEE & ECE					

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Determine the mathematical modeling of physical systems	K3
CO2	Estimate Time domain specifications of first and second order systems , understand the effect of controllers and investigate the stability	K3
CO3	Find the stability of control systems using frequency response approaches	K3
CO4	Design the Compensator using classical design techniques	K6
CO5	Analyze physical systems using state space approach	K4

UNIT - 1

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 - 2

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 proportional (P) - proportional integral (PI) - proportional derivative (PD) proportional integral derivative (PID) systems.

Stability And Root Locus Technique

The 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 - 3

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 - 4

Compensator Design Techniques

Lag, lead, lag-lead compensators - physical realisation - design of compensators using Bode plots.

UNIT - 5

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 International 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

Semester	IV SEM	L	T	P	C	COURSE CODE
Regulation	V23	0	0	3	1.5	V23EEL05
Name of the Course	Induction and Synchronous Machines Lab					
Branches	EEE					

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Aanalyse the speed control methods on 3-phase Induction Motor.	K4
CO2	Evaluate the performance of 3-phase Induction Motor by obtaining the locus diagram and equivalent circuit of 3-phase Induction Motor	K5
CO3	Demonstrate the power factor improvement methods, performance and equivalent circuit of single phase Induction Motor.	K3
CO4	Determine the regulation of 3-phase alternator using pre - determination methods.	K4
CO5	Demonstrate parallel operation of 3-Φ alternator, V and Inverted V curves of 3-Φ synchronous motor.	K3

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.

Online Learning Resources:

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

Semester	IV SEM	L	T	P	C	COURSE CODE
Regulation	V23	0	0	3	1.5	V23EEL06
Name of the Course	Control Systems Lab					
Branches	EEE					

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Demonstrate the knowledge of simulation tools for control system design.	K3
CO2	Develop the mathematical model of a given physical system by conducting appropriate experiments.	K4
CO3	Analyse the performance and stability of physical systems using classical and advanced control approaches.	K5
CO4	Design controllers for physical systems to meet the desired specifications.	K6
CO5	Analyse the effect of PID controllers	K5

List of Experiments

Any 10 of the following experiments are 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 5^{th} order using 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.