VEL TECH MULTITECH
Dr RANGARAJAN Dr.SAKUNTHALA ENGINEERING COLLEGE

(An ISO 9001: 2008 Certified Institution)
(Owned by Vel Trust)
(Approved by Govt. of Tamil Nadu and affiliated to Anna University and Accredited by NBA, New Delhi)

SYLLABUS

WEEKLY SCHEDULE

V SEMESTER 2015 - 2016

DEPARTMENT OF EEE

IV YEAR DEGREE COURSE

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Chennai – 600062
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WEEK DETAILS

SL.NO.	WEEK	FROM	TO
1	**WEEK1**	**24.06.2015**	**26.06.2015**
2	**WEEK2**	**29.06.2015**	**03.07.2015**
3	**WEEK3**	**06.07.2015**	**10.07.2015**
4	**WEEK4**	**13.07.2015**	**17.07.2015**
5	**WEEK5**	**20.07.2015**	**24.07.2015**
6	**WEEK6**	**27.07.2015**	**28.07.2015**
7	**WEEK7**	**03.08.2015**	**07.08.2015**
8	**WEEK8**	**10.08.2015**	**14.08.2015**
9	**WEEK9**	**17.08.2015**	**21.08.2015**
10	**WEEK10**	**24.08.2015**	**28.08.2015**
11	**WEEK11**	**31.08.2015**	**04.09.2015**
12	**WEEK12**	**07.09.2015**	**11.09.2015**
13	**WEEK13**	**14.09.2015**	**18.09.2015**
14	**WEEK14**	**21.09.2015**	**25.09.2015**
15	**WEEK15**	**28.09.2015**	**30.09.2015**
16	**WEEK16**	**05.10.2015**	**09.10.2015**
17	**WEEK17**	**12.10.2015**	**16.10.2015**
18	**WEEK18**	**19.10.2015**	**20.10.2015**
19	**WEEK19**	**27.10.2015**	**30.10.2015**

SUBJECT CONTENTS

SL.NO	SUBJECT CODE	SUBJECT NAME
THEORY		
1	EE6501	Power System Analysis
2	EE6502	Microprocessors and Microcontrollers
3	ME6701	Power Plant Engineering
4	EE6503	Power Electronics
5	EE6504	Electrical Machines - II
6	IC6501	Control Systems
PRACTICAL		
7	EE6511	Control and Instrumentation Laboratory
8	GE6563	Communication Skills - Laboratory Based
9	EE6512	Electrical Machines Laboratory - II

TEST / EXAM SCHEDULE

SL.NO	SUBJECT CODE	SUBJECT NAME	UNIT TEST I	UNIT TEST II	PRE MODEL EXAM	UNIT TEST IV
1	EE6501	Power System Analysis	13.07.2015	03.08.2015	21.08.2015	14.09.2015
2	EE6502	Microprocessors and Microcontrollers	14.07.2015	04.08.2015	22.08.2015	15.09.2015
3	ME6701	Power Plant Engineering	15.07.2015	05.08.2015	24.08.2015	16.09.2015
4	EE6503	Power Electronics	16.07.2015	06.08.2015	25.08.2015	18.09.2015
5	EE6504	Electrical Machines - II	17.07.2015	07.08.2015	26.08.2015	21.09.2015
6	IC6501	Control Systems	20.07.2015	10.08.2015	27.08.2015	22.09.2015

SL.NO	SUBJECT CODE	SUBJECT NAME	MODEL EXAM
1	EE6501	Power System Analysis	05.10.2015
2	EE6502	Microprocessors and Microcontrollers	06.10.2015
3	ME6701	Power Plant Engineering	07.10.2015
4	EE6503	Power Electronics	08.10.2015
5	EE6504	Electrical Machines - II	09.10.2015
6	IC6501	Control Systems	12.10.2015

EE6501 POWER SYSTEM ANALYSIS

WEEK 1:

UNIT I INTRODUCTION

Need for system planning and operational studies – basic components of a power system.-Introduction to restructuring

WEEK 2:

Single line diagram – per phase and per unit analysis – Generator - transformer transmission line and load representation for different power system studies

WEEK 3

Primitive network - construction of Y-bus using inspection and singular transformation methods – z-bus

WEEK 4: UNIT TEST-I

UNIT II POWER FLOW ANALYSIS

Importance of power flow analysis in planning and operation of power systems - statement of power flow problem

WEEK 5:

Classification of buses - development of power flow model in complex variables form -iterative solution using Gauss-Seidel method

WEEK 6:

Q-limit check for voltage controlled buses – power flow model in polar form - iterative solution using Newton-Raphson method.

WEEK 7: UNIT TEST-II

UNIT III FAULT ANALYSIS – BALANCED FAULTS

Importance of short circuit analysis - assumptions in fault analysis - analysis using Thevenin's theorem

WEEK 8:

Z-bus building algorithm - fault analysis using Z-bus

WEEK 9:

Computations of short circuit capacity, post fault voltage and currents

WEEK 10: UNIT TEST-III

UNIT IV FAULT ANALYSIS – UNBALANCED FAULTS

Introduction to symmetrical components – sequence impedances – sequence circuits of synchronous machine, transformer and transmission lines

WEEK 11:

Sequence networks analysis of single line to ground, line to line and double line to ground faults using Thevenin's theorem and Z-bus matrix.

WEEK 12:

UNIT V STABILITY ANALYSIS

WEEK 13: UNIT TEST-IV

Importance of stability analysis in power system planning and operation - classification of power system stability

WEEK 14:

Angle and voltage stability – Single Machine Infinite Bus (SMIB) system: Development of swing equation - equal area criterion

WEEK 15:

Determination of critical clearing angle and time– solution of swing equation by modified Euler method and Runge-Kutta fourth order method

WEEK 16: UNIT TEST-V

WEEK 17: MODEL EXAM

WEEK 18: MODEL PRACTICAL EXAM

TEXT BOOK:

1. Nagrath I.J. and Kothari D.P., 'Modern Power System Analysis', Tata McGraw-Hill, Fourth Edition, 2011.
2. John J. Grainger and W.D. Stevenson Jr., 'Power System Analysis', Tata McGraw-Hill, Sixth reprint, 2010.
3. P. Venkatesh, B.V. Manikandan, S. Charles Raja, A. Srinivasan, ' Electrical Power Systems-
4. Analysis, Security and Deregulation', PHI Learning Private Limited, New Delhi, 2012.

REFERENCES:

1. Hadi Saadat, 'Power System Analysis', Tata McGraw Hill Education Pvt. Ltd., New Delhi, 21st reprint, 2010.
2. Kundur P., 'Power System Stability and Control, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 10th reprint, 2010.
3. Pai M A, 'Computer Techniques in Power System Analysis', Tata Mc Graw-Hill Publishing Company Ltd., New Delhi, Second Edition, 2007.

5. J. Duncan Glover, Mulukutla S. Sarma, Thomas J. Overbye, ' Power System Analysis & Design', Cengage Learning, Fifth Edition, 2012.
6. Olle. I. Elgerd, 'Electric Energy Systems Theory – An Introduction', Tata McGraw Hill Publishing Company Limited, New Delhi, Second Edition, 2012.
7. C.A.Gross, "Power System Analysis," Wiley India, 2011.

EE6502 MICROPROCESSORS AND MICROCONTROLLERS

WEEK 1:

UNIT I 8085 PROCESSOR

Hardware Architecture, pinouts – Functional Building Blocks of Processor

WEEK 2:

Memory organization –I/O ports and data transfer concepts

WEEK 3

Timing Diagram – Interrupts

WEEK 4: UNIT TEST-I

UNIT II PROGRAMMING OF 8085 PROCESSOR

Instruction -format and addressing modes – Assembly language format – Data transfer, data manipulation& control instructions

WEEK 5:

Programming: Loop structure with counting & Indexing

WEEK 6:

Look up table - Subroutine instructions - stack

WEEK 7: UNIT TEST-II

UNIT III 8051 MICRO CONTROLLER

Hardware Architecture, pintouts – Functional Building Blocks of Processor – Memory organization

WEEK 8:

I/O ports and data transfer concepts– Timing Diagram

WEEK 9:

Interrupts-Comparison to Programming concepts with 8085

WEEK 10: UNIT TEST-III

UNIT IV PERIPHERAL INTERFACING

Study on need, Architecture, configuration and interfacing, with ICs: 8255, 8259, 8254, 8237, and 8251

WEEK 11:

8279, - A/D and D/A converters &Interfacing with 8085& 8051

WEEK 12:

UNIT V MICRO CONTROLLER PROGRAMMING & APPLICATIONS

WEEK 13: UNIT TEST-IV

Data Transfer, Manipulation, Control Algorithms& I/O instructions

WEEK 14:

Simple programming exerciseskey board and display interface – Closed loop control of servo motor

WEEK 15:

Stepper motor control –Washing Machine Control

WEEK 16: UNIT TEST-V

WEEK 17: MODEL EXAM

WEEK 18: MODEL PRACTICAL EXAM

TEXT BOOK:

1. Krishna Kant, "Microprocessor and Microcontrollers", Eastern Company Edition, Prentice Hall of India, New Delhi , 2007.
2. R.S. Gaonkar, 'Microprocessor Architecture Programming and Application', with 8085, Wiley Eastern Ltd., New Delhi, 2013.
3. Soumitra Kumar Mandal, Microprocessor & Microcontroller Architecture, Programming & Interfacing using 8085,8086,8051,McGraw Hill Edu,2013.

REFERENCES:

1. Muhammad Ali Mazidi & Janice Gilli Mazidi, R.D.Kinely 'The 8051 Micro Controller and Embedded Systems', PHI Pearson Education, 5th Indian reprint, 2003.
2. N.Senthil Kumar, M.Saravanan, S.Jeevananthan, 'Microprocessors and Microcontrollers', Oxford,2013.
3. Valder – Perez, "Microcontroller – Fundamentals and Applications with Pic," Yeesdee Publishers, Tayler & Francis, 2013.

ME6701 POWER PLANT ENGINEERING

WEEK I: UNIT I COAL BASED THERMAL POWER PLANTS

Rankine cycle - improvisations, Layout of modern coal power plant, Super Critical Boilers, FBC

WEEK 2:

Boilers, Turbines, Condensers, Steam & Heat rate, Subsystems of thermal power plants – Fuel and ash handling

WEEK 3:

Draught system, Feed water treatment Binary Cycles and Cogeneration systems

WEEK 4: UNIT TEST-I

UNIT II DIESEL, GAS TURBINE AND COMBINED CYCLE POWER PLANTS

Otto, Diesel, Dual & Brayton Cycle - Analysis & Optimisation

WEEK 5:

Components of Diesel and Gas Turbine power plants Combined Cycle Power Plants

WEEK 6:

Integrated Gasifier based Combined Cycle systems.

UNIT III NUCLEAR POWER PLANTS

Basics of Nuclear Engineering, Layout and subsystems of Nuclear Power Plants, Working of Nuclear Reactors

WEEK 7:

UNIT TEST-II

Boiling Water Reactor (BWR), P*ressurized Water Reactor* (PWR), CANada Deuterium-
Uranium reactor (CANDU)

WEEK 8:

Breeder, Gas Cooled and Liquid Metal Cooled Reactors. Safety measures for Nuclear Power plants

WEEK 9: UNIT TEST-III

UNIT IV POWER FROM RENEWABLE ENERGY

Hydro Electric Power Plants – Classification, Typical Layout and associated components including

WEEK 10:

Turbines Principle, Construction and working of Wind, Tidal, *Solar* Photo Voltaic (SPV), Solar

WEEK 11:

Thermal, Geo Thermal, Biogas and Fuel Cell power systems

WEEK 12:

UNIT V ENERGY, ECONOMIC AND ENVIRONMENTAL ISSUES OF POWER PLANTS

Power tariff types, Load distribution parameters, load curve, Comparison of site selection criteria

WEEK 13:

UNIT TEST-IV

Relative merits & demerits, Capital

WEEK 14:

Operating Cost of different power plants

WEEK 15:

Pollution control technologies including Waste Disposal Options for Coal and Nuclear Power Plants

WEEK 16: UNIT TEST-V

WEEK 17: MODEL EXAM

WEEK 18: MODEL PRACTICAL EXAM

TEXT BOOKS

1. P.K. Nag, Power Plant Engineering, Tata McGraw – Hill Publishing Company Ltd., Third Edition, 2008

REFERENCES

1. M.M. El-Wakil, Power Plant Technology, Tata McGraw – Hill Publishing Company Ltd., 2010.
2. Black & Veatch, Springer, Power Plant Engineering, 1996.
3. Thomas C. Elliott, Kao Chen and Robert C. Swanekamp, Standard Handbook of Power Plant Engineering, Second Edition, McGraw – Hill, 1998.
4. Godfrey Boyle, Renewable energy, Open University, Oxford University Press in association with the Open University, 2004..

EE6503 POWER ELECTRONICS

WEEK 1:

UNIT I POWERSEMI-CONDUCTOR DEVICES

Study of switching devices, Diode, SCR,TRIAC

WEEK 2: GTO, BJT, MOSFET, IGBT-Static and Dynamic Characteristics

WEEK 3: Triggering and commutation circuit for SCR- Design of Driver and snubber circuit

WEEK 4: UNIT TEST-I

UNIT II PHASE-CONTROLLED CONVERTERS

2-pulse,3-pulse and 6-pulseconverters– performance parameters

WEEK 5:

Effect of source inductance

WEEK 6:

Gate Circuit Schemes for Phase Control–Dual converters

WEEK 7:

UNIT TEST-II

UNIT III DC TO DC CONVERTER

Step-down and step-up chopper-control strategy–Forced commutated chopper–Voltage commutated

WEEK 8:

Current commutated, Load commutated, Switched mode regulators

WEEK 9:

Buck, boost, buck- boost converter, Introduction to Resonant Converters

WEEK 10: UNIT TEST-III

UNIT IV INVERTERS

Single phase and three phase voltage source inverters (both 120° mode and 180° mode)

WEEK 11:

Voltage& harmonic control--PWM techniques: Sinusoidal PWM, modified sinusoidal PWM

WEEK 12:

Multiple PWM – Introduction to space vector modulation –Current source inverter

UNIT V AC TO AC CONVERTERS

WEEK 13:

UNIT TEST-IV

Single phase and Three phase AC voltage controllers–Control strategy- Power Factor Control

WEEK 14:

Multistage sequence control -single phase and three phase cyclo converters,

WEEK 15:

Introduction to Matrix converters

WEEK 16: UNIT TEST-V

WEEK 17: MODEL EXAM

WEEK 18: MODEL PRACTICAL EXAM

TEXT BOOKS

1. M.H.Rashid, 'Power Electronics: Circuits, Devices and Applications', Pearson Education, PHI Third Edition, New Delhi, 2004.
2. P.S.Bimbra "Power Electronics" Khanna Publishers, third Edition, 2003.
3. L. Umanand, " Power Electronics Essentials and Applications", Wiley, 2010

REFERENCES

1. Joseph Vithayathil,' Power Electronics, Principles and Applications', McGraw Hill Series, 6th Reprint, 2013.
2. Ashfaq Ahmed Power Electronics for Technology Pearson Education, Indian reprint, 2003.
3. Philip T. Krein, "Elements of Power Electronics" Oxford University Press, 2004 Edition. Ned Mohan, Tore. M. Undel and, William. P. Robbins,' Power Electronics: Converters, Applications and Design', John Wiley and sons, third edition,2003.
4. Daniel.W.Hart, "Power Electronics", Indian Edition, Mc Graw Hill, 3rd Print, 2013.
5. M.D. Singh and K.B. Khanchandani, "Power Electronics," Mc Graw Hill India, 2013.

EE6504 ELECTRICAL MACHINES – II

WEEK 1:

UNIT I SYNCHRONOUS GENERATOR

Constructional details – Types of rotors –winding factors- emf equation – Synchronous reactance

WEEK 2:

Armature reaction – Phasor diagrams of non salient pole synchronous generator connected to infinite bus

WEEK 3:

Synchronizing and parallel operation – Synchronizing torque -Change of excitation and mechanical input- Voltage regulation – EMF, MMF, ZPF and A.S.A methods – steady state power angle characteristics– Two reaction theory –slip test -short circuit transients - Capability Curves

WEEK 4: UNIT TEST-I

UNIT II SYNCHRONOUS MOTOR

Principle of operation – Torque equation – Operation on infinite bus bars - V and Inverted V curves

WEEK 5:

Power input and power developed equations – Starting methods – Current loci for constant power input, constant excitation and constant power developed

WEEK 6:

Hunting – natural frequency of oscillations –damper windings- synchronous condenser

WEEK 7:

UNIT III THREE PHASE INDUCTION MOTOR

Constructional details – Types of rotors –- Principle of operation – Slip –cogging and crawling- Equivalent circuit

WEEK 8:

Torque-Slip characteristics - Condition for maximum torque – Losses and efficiency – Load test

WEEK 9:

No load and blocked rotor tests - Circle diagram – Separation of losses – Double cage induction motors –Induction generators – Synchronous induction motor.

WEEK 10: UNIT TEST-III

UNIT IV STARTING AND SPEED CONTROL OF THREE PHASE INDUCTION MOTOR

Need for starting – Types of starters – DOL, Rotor resistance, Autotransformer and Star-delta starters– Speed control

WEEK 11:

Voltage control, Frequency control and pole changing – Cascaded connection-V/f control

WEEK 12:

Slip power recovery scheme-Braking of three phase induction motor: Plugging, dynamic braking and regenerative braking

UNIT V SINGLE PHASE INDUCTION MOTORS AND SPECIAL MACHINES

WEEK 13:

UNIT TEST-IV

Constructional details of single phase induction motor – Double field revolving theory and operation –Equivalent circuit

WEEK 14:

No load and blocked rotor test – Performance analysis – Starting methods of

single-phase induction motors –

WEEK 15:

Capacitor-start capacitor run Induction motor- Shaded pole induction motor - Linear induction motor – Repulsion motor

WEEK 16: Hysteresis motor - AC series motor- Servo motors- Stepper motors - introduction to magnetic levitation systems

WEEK 16: UNIT TEST-V

WEEK 17: MODEL EXAM

WEEK 18: MODEL PRACTICAL EXAM

TEXT BOOKS

1. A.E. Fitzgerald, Charles Kingsley, Stephen. D.Umans, 'Electric Machinery', Tata
   Mc Graw Hill publishing Company Ltd, 2003.

2. D.P. Kothari and I.J. Nagrath, 'Electric Machines', Tata McGraw Hill Publishing
   Company Ltd, 2002.
3. P.S. Bhimbhra, 'Electrical Machinery', Khanna Publishers, 2003

REFERENCES

1. M.N.Bandyopadhyay, Electrical Machines Theory and Practice, PHI Learning PVT LTD., New Delhi, 2009.
2. Charless A. Gross, "Electric /Machines, "CRC Press, 2010.
3. K. Murugesh Kumar, 'Electric Machines', Vikas Publishing House Pvt. Ltd, 2002.
4. Syed A. Nasar, Electric Machines and Power Systems: Volume I, Mcgraw -Hill College; International ed Edition, January 1995.
5. Alexander S. Langsdorf, Theory of Alternating-Current Machinery, Tata McGraw Hill Publications, 2001.

IC6501 CONTROL SYSTEMS

UNIT I SYSTEMS AND THEIR REPRESENTATION

WEEK 1: Basic elements in control systems – Open and closed loop systems,

WEEK 2: Electrical analogy of mechanical and thermal systems – Transfer function – Synchros

WEEK 3: AC and DC servomotors – Block diagram reduction techniques – Signal flow graphs

WEEK 4: UNIT TEST-I

UNIT II TIME RESPONSE

Time response – Time domain specifications – Types of test input

WEEK 5: I and II order system response –Error coefficients – Generalized error series

WEEK 6: Steady state error – Root locus construction

WEEK 7:

Effects of P, PI, PID modes of feedback control –Time response analysis

WEEK 8:

UNIT TEST-II

UNIT III FREQUENCY RESPONSE

Frequency response – Bode plot – Polar plot – Determination of closed loop response from open loop response -

WEEK 9:

Correlation between frequency domain and time domain specifications

WEEK 10:

Effect of Lag, lead and lag-lead compensation on frequency response-Analysis

WEEK 11: UNIT TEST-III

UNIT IV STABILITY AND COMPENSATOR DESIGN

Characteristics equation – Routh Hurwitz criterion – Nyquist stability criterion- Performance criteria

WEEK 12: Lag, lead and lag-lead networks – Lag/Lead compensator design using bode plots

WEEK 13: UNIT TEST-IV

UNIT V STATE VARIABLE ANALYSIS

Concept of state variables – State models for linear and time invariant Systems

WEEK 14:

Solution of state and output equation in controllable canonical form

WEEK 15:

Concepts of controllability and observability –Effect of state feedback.

WEEK 16: UNIT TEST-V

WEEK 17: MODEL EXAM

WEEK 18: MODEL PRACTICAL EXAM

TEXT BOOKS

1. M. Gopal, 'Control Systems, Principles and Design', 4th Edition, Tata McGraw Hill, New Delhi, 2012
2. S.K.Bhattacharya, Control System Engineering, 3rd Edition, Pearson, 2013.
3. Dhanesh. N. Manik, Control System, Cengage Learning, 2012.

REFERENCES

1. Arthur, G.O.Mutambara, Design and Analysis of Control; Systems, CRC Press, 2009.
2. Richard C. Dorf and Robert H. Bishop, " Modern Control Systems", Pearson Prentice Hall, 2012.
3. Benjamin C. Kuo, Automatic Control systems, 7th Edition, PHI, 2010.
4. K. Ogata, 'Modern Control Engineering', 5th edition, PHI, 2012.
5. S.N.Sivanandam, S.N.Deepa, Control System Engineering using Mat Lab, 2nd Edition, Vikas Publishing, 2012.
6. S.Palani, Anoop. K.Jairath, Automatic Control Systems including Mat Lab, Vijay Nicole/ Mcgraw Hill Education, 2013.

EE6511 CONTROL AND INSTRUMENTATION LABORATORY

LIST OF EXPERIMENTS:

CONTROLSYSTEMS:

1. P, PI and PID controllers
2. Stability Analysis
3. Modeling of Systems – Machines, Sensors and Transducers
4. Design of Lag, Lead and Lag-Lead Compensators
5. Position Control Systems
6. Synchro-Transmitter- Receiver and Characteristics
7. Simulation of Control Systems by Mathematical development tools.

INSTRUMENTATION:

8. Bridge Networks –AC and DC Bridges
9. Dynamics of Sensors/Transducers a.
    a. Temperature
    b. Pressure
    c. Displacement
    d. Optical
    e. Strain f. Flow

10. Power and Energy Measurement
11. Signal Conditioning
a. Instrumentation Amplifier
b. Analog – Digital and Digital –Analog converters (ADC and DACs)
12. Process Simulation

GE6674 COMMUNICATION AND SOFT SKILLS - LABORATORY BASED

UNIT I LISTENING AND SPEAKING SKILLS

Conversational skills (formal and informal) – group discussion and interview skills – making presentations. Listening to lectures, discussions, talk shows, news programmes, dialogues from TV/radio/Ted talk/Podcast – watching videos on interesting events on Youtube

UNIT II READING AND WRITING SKILLS

Reading different genres of tests ranging from newspapers to philosophical treatises – reading strategies such as graphic organizers, summarizing and interpretation Writing job applications – cover letter – resume – emails – letters – memos – reports – blogs – writing for publications.

UNIT III ENGLISH FOR NATIONAL AND INTERNATIONAL EXAMINATIONS
AND PLACEMENTS

International English Language Testing System (IELTS) – Test of English as a Foreign Language (TOEFL) – Graduate Record Examination (GRE) – Civil Service (Language related) – Verbal ability.

UNIT IV SOFT SKILLS (1)

Motivation – self image – goal setting – managing changes – time management – stress management – leadership traits – team work – career and life planning.

UNIT V SOFT SKILLS (2)

Multiple intelligences – emotional intelligence – spiritual quotient (ethics) – intercultural communication – creative and critical thinking – learning styles and strategies

EE6512 ELECTRICAL MACHINES LABORATORY - II

LIST OF EXPERIMENTS:

1. Regulation of three phase alternator by EMF and MMF methods.
2. Regulation of three phase alternator by ZPF and ASA methods.
3. Regulation of three phase salient pole alternator by slip test.
4. Measurements of negative sequence and zero sequence impedance of alternators.
5. V and Inverted V curves of Three Phase Synchronous Motor.
6. Load test on three-phase induction motor.
7. No load and blocked rotor test on three-phase induction motor(Determination of equivalent circuit parameters).
8. Separation of No-load losses of three-phase induction motor.
9. Load test on single-phase induction motor.
10. No load and blocked rotor test on single-phase induction motor.
11. Study of Induction motor Starters

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