VEL TECH MULTI TECH Dr. RANGARAJAN Dr. SAKUNTHALA ENGINEERING COLLEGE

Approved By AICTE, Affiliated to Anna University,
Chennai
ISO 9001:2015 Certified Institution, Accredited byNBA (BME,CSE, ECE, EEE, IT&MECH),
Accredited by NAAC with 'A' Grade with CGPA of 3.49.
#42, Avadi-Vel Tech Road, Avadi,Chennai-600062, Tamil Nadu,
India.

SYLLABUS

WEEKLY SCHEDULE

VI SEMESTER 2019- 2020
DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING
III DEGREE COURSE

#42, Avadi – Vel Tech Road,
Avadi, Chennai – 600062
Telefax – 044-26841061
E-mail: emailto@veltechmultitech.orgWebsite : www.veltechmultitech.org

---

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

VISION

To emerge as a centre of academic excellence in electrical and electronics engineering and related fields through knowledge acquisition and propagation meeting global practices

MISSION

M1 - To nurture the talent and to facilitate the students with research ambience in electrical and electronics engineering

M2 - To propagate lifelong learning

M3 - To impart the right proportion of knowledge, attitudes and ethics in students to enable them take up positions of responsibility in the society and make significant contributions.

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEOs	Programme Educational Objectives (PEOs)
PEO1	To prepare graduates to have successful and flourishing career in the Electrical and Electronics industry.
PEO2	To make students able to excel in their career with ethical values and managerial skills to solve real life technical problems.
PEO3	To make students capable of solving problems in Electrical and Electronics engineering which are found in utilities and industries
PEO4	To help students to engage in quest for self-learning and life-long learning.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO's	Programme Specific Outcomes(PSOs)
PSO1	Inspect the systems using the fundamental knowledge of Engineering
PSO2	Evaluate and apply logical skills to solve technical problems for the progression of society
PSO3	Design and quantify solutions using the knowledge gained from inter-disciplinary skills
PSO4	Recognize the dynamic nature of Electrical Engineering, and create advanced electrical systems

Pos	Programme Outcomes (POs)
PO1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give
PO11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

WEEK DETAILS

SL.NO.	WEEK	FROM	TO
1	**WEEK1**	**16.12.2019**	**20.12.2019**
2	**WEEK2**	**2.01.2020**	**04.01.2020**
3	**WEEK3**	**06.01.2020**	**11.01.2020**
4	**WEEK4**	**13.01.2020**	**14.01.2020**
5	**WEEK5**	**20.01.2020**	**25.01.2020**
6	**WEEK6**	**27.01.2020**	**01.02.2020**
7	**WEEK7**	**03.02.2020**	**08.02.2020**
8	**WEEK8**	**10.02.2020**	**15.02.2020**
9	**WEEK9**	**17.02.2020**	**22.02.2020**
10	**WEEK10**	**24.02.2020**	**29.02.2020**
11	**WEEK11**	**02.03.2020**	**07.02.2020**
12	**WEEK12**	**09.03.2020**	**14.03.2020**
13	**WEEK13**	**16.03.2020**	**21.03.2020**
14	**WEEK14**	**23.03.2020**	**27.03.2020**

SUBJECT CONTENTS

SL.NO	SUBJECT CODE	SUBJECT NAME
THEORY		
1	EE8601	SOLID STATE DRIVES
2	EE8602	PROTECTION AND SWITCHGEAR
3	EE8691	EMBEDDED SYSTEMS
4	GE8075	INTELLECTUAL PROPERTY RIGHTS
5	EE8005	SPECIAL ELECTRICAL MACHINES
PRACTICAL		
1	EE8661	POWER ELECTRONICS AND DRIVES LABORATORY
2	EE8681	MICROPROCESSORS AND MICROCONTROLLERS LABORATORY
3	EE8611	MINI PROJECT

TEST / EXAM SCHEDULE

.NO	SUBJECT CODE	SUBJECT NAME	CAT-1	CAT-2	CAT-3
1	EE8601	Solid State Drives	03.02.2020 FN	02.03.2020 FN	16.03.2020 FN
2	EE8602	Protection and Switchgear	04.02.2020 FN	03.02.2020 FN	17.03.2020 FN
3	EE8691	Embedded Systems	05.02.2020 FN	04.03.2020 FN	18.03.2020 FN
4	GE8075	Intellectual Property Rights	06.02.2020 FN	05.03.2020 FN	19.03.2020 FN
5	EE8005	Special Electrical Machines	07.02.2020 FN	06.02.2020 FN	20.03.2020 FN

EE8601 SOLID STATE DRIVES

UNIT 1DRIVE CHARACTERISTICS

WEEK-1 Electric drive – Equations governing motor load dynamics steady state stability – multi quadrant Dynamics

WEEK-2 acceleration, deceleration, starting & stopping

WEEK-3 typical load torque characteristics, Selection of motor

UNIT 2 CONVERTER / CHOPPER FED DC MOTOR DRIVE

Steady state analysis of the single

WEEK-4 : CAT-I & three phase converter fed separately excited DC motor drive

WEEK -5 continuous conduction

WEEK -6 Time ratio and current limit control, 4 quadrant operation of converter / chopper fed drive-Applications

WEEK-7

UNIT 3 INDUCTION MOTOR DRIVES

WEEK-8 Rotor Resistance control, qualitative treatment of slip power, recovery drives-closed loop control

WEEK-9 vector control- Applications.

UNIT 4 SYNCHRONOUS MOTOR DRIVES

WEEK -10 Stator voltage control–V/f control, V/f control and self-control of synchronous motor

WEEK-11: CAT-II & Margin angle control and power factor control Three phase voltage/current source fed synchronous motor, Applications

WEEK- 12

UNIT V DESIGN OF CONTROLLERS FOR DRIVES

Transfer function for DC motor / load and converter – closed loop control with Current and speed feedback, armature voltage control and field weakening mode

WEEK-13 : Design of controllers; current controller and speed controller, converter selection and characteristics

WEEK 14 : CAT-III

TEXT BOOKS:

1. Gopal K.Dubey, Fundamentals of Electrical Drives, Narosa Publishing House, 1992.
2. Bimal K.Bose. Modern Power Electronics and AC Drives, Pearson Education, 2002.
3. R.Krishnan, Electric Motor & Drives: Modeling, Analysis and Control, Pearson, 2001.

REFERENCES:

1. Vedam Subramanyam, " Electric Drives Concepts and Applications ", 2e, McGraw Hill, 2016 75
2. Shaahin Felizadeh, "Electric Machines and Drives", CRC Press (Taylor and Francis Group), 2013.
3. John Hindmarsh and Alasdain Renfrew, "Electrical Machines and Drives System," Elsevier 2012.
4. Theodore Wildi, " Electrical Machines ,Drives and power systems ,6th edition, Pearson Education ,2015
5. N.K. De., P.K. SEN" Electric drives" PHI, 2012.

WEEK-1

UNIT 1 PROTECTION SCHEMES

Principles and need for protective schemes – nature and causes of faults

WEEK-2 types of faults – Methods of Grounding, Zones of protection and essential qualities of protection

WEEK-3 Protection scheme

UNIT II ELECTROMAGNETIC RELAYS

Operating principles of relays, the Universal relay – Torque equation

WEEK-4 : CAT –I & R-X diagram – Electromagnetic Relays, Over current, Directional, Distance, Differential

WEEK -5 Negative sequence and Under frequency relays

UNIT III APPARATUS PROTECTION

Current transformers

WEEK -6 Potential transformers, and their applications in protection schemes

WEEK-7 Protection of transformer, generator,

WEEK-8 motor, bus bars and transmission line

UNIT IV STATIC RELAYS AND NUMERICAL PROTECTION

WEEK-9 Static relays – Phase, Amplitude Comparators, Synthesis of various relays using Static comparators

WEEK -10 Over current protection, transformer differential protection, distant protection of transmission lines.

WEEK-11: CAT-II

UNIT V CIRCUIT BREAKERS

Physics of arcing phenomenon and arc interruption - DC and AC circuit breaking, re-striking voltage and recovery voltage - rate of rise of recovery voltage

WEEK- 12 resistance switching - current chopping - interruption of capacitive current, Types of circuit breakers – air blast, air break, oil, SF6, MCBs, MCCBs and vacuum circuit breakers

WEEK-13 : comparison of different circuit breakers – Rating and selection of Circuit breakers.

WEEK 14 : CAT-III

TEXT BOOKS:

1. Sunil S.Rao, 'Switchgear and Protection', Khanna Publishers, New Delhi, 2008.
2. B.Rabindranath and N.Chander, 'Power System Protection and Switchgear', New Age International (P) Ltd., First Edition 2011.
3. Arun Ingole, 'Switch Gear and Protection' Pearson Education, 2017.

REFERENCES:

1. BadriRam ,B.H. Vishwakarma, 'Power System Protection and Switchgear', New Age InternationalPvt Ltd Publishers, Second Edition 2011.
2. Y.G.Paithankar and S.R.Bhide, 'Fundamentals of power system protection', Second Edition,Prentice Hall of India Pvt. Ltd., New Delhi, 2010.
3. C.L.Wadhwa, 'Electrical Power Systems', 6th Edition, New Age International (P) Ltd., 2010
4. RavindraP.Singh, 'Switchgear and Power System Protection', PHI Learning Private Ltd., NewDelhi, 2009.
5. VK Metha," Principles of Power Systems" S. Chand, 2005.
6. Bhavesh Bhalja, R.P. Maheshwari, Nilesh G. Chotani,'Protection and Switchgear' Oxford University Press, 2011.

EMBEDDED SYSTEMS

EE8691

WEEK-1

UNIT I INTRODUCTION TO EMBEDDED SYSTEMS

Introduction to Embedded Systems –Structural units in embedded processor

WEEK-2: selection of processor & memory devices- DMA – Memory management methods- Timer and Counting devices, Watchdog Timer, Real Time Clock, In circuit emulator,
WEEK-3: Target Hardware Debugging.

UNIT II EMBEDDED NETWORKING

Embedded Networking: Introduction, I/O Device Ports
WEEK-4: **CAT – I &** Buses Serial Bus communication protocols RS232 standard – RS422
WEEK-5 RS 485 - CAN Bus –Serial Peripheral Interface (SPI) – Inter Integrated Circuits (I^2C) –need for device drivers

UNIT III EMBEDDED FIRMWARE DEVELOPMENT ENVIRONMENT

Embedded Product Development Life Cycle
WEEK-6 objectives, different phases of EDLC, Modelling of EDLC
WEEK-7
Hardware-software Co-design, Data Flow Graph, state machine model
WEEK-8 Sequential Program Model, concurrent Model, object oriented Model.

UNIT IV RTOS BASED EMBEDDED SYSTEM DESIGN

Introduction to basic concepts of RTOS- Task, process & threads
WEEK-9 interrupt routines in RTOS, Multiprocessing and Multitasking, Preemptive and non-preemptive scheduling, Task communication shared memory,
WEEK-10 message passing, Inter process Communication, synchronization between processes- semaphores, Mailbox, pipes, priority inversion, priority inheritance.
WEEK-11 CAT – II

UNIT V EMBEDDED SYSTEM APPLICATION AND DEVELOPMENT

Case Study of Washing Machine- Automotive Application
WEEK 12: Smart card System
WEEK 13: Application-ATM machine –Digital camera
WEEK 14: CAT III

TEXT BOOKS:

1. Peckol, “Embedded system Design”, John Wiley & Sons,2010
2. Lyla B Das,” Embedded Systems-An Integrated Approach”, Pearson, 2013
3. Shibu. K.V, “Introduction to Embedded Systems”, 2e, Mc graw Hill, 2017.

REFERENCES:

1. Raj Kamal, ‘Embedded System-Architecture, Programming, Design’, Mc Graw Hill, 2013.
2. C.R.Sarma, “Embedded Systems Engineering”, University Press (India) Pvt. Ltd, 2013.
3. Tammy Noergaard, “Embedded Systems Architecture”, Elsevier, 2006.
4. Han-Way Huang, “Embedded system Design Using C8051”, Cengage Learning, 2009.
5. Rajib Mall “Real-Time systems Theory and Practice” Pearson Education, 2007.

INTELLECTUAL PROPERTY RIGHTS

GE8075

WEEK-1

UNIT I INTRODUCTION

Introduction to IPRs, Basic concepts and need for Intellectual Property, Patents, Copyrights, Geographical Indications

WEEK-2: IPR in India and Abroad – Genesis and Development, the way from WTO to WIPO – TRIPS, Nature of Intellectual Property

WEEK-3: Industrial Property, technological Research, Inventions and Innovations – Important examples of IPR.

UNIT II REGISTRATION OF IPRs

Meaning and practical aspects of registration of Copy Rights

WEEK-4: **CAT - I** & Trademarks, Patents

WEEK-5 Geographical Indications, Trade Secrets and Industrial Design registration in India and Abroad

UNIT III AGREEMENTS AND LEGISLATIONS

Embedded Product Development Life Cycle

WEEK-6 International Treaties and Conventions on IPRs, TRIPS Agreement, PCT Agreement

WEEK-7

Patent Act of India, Patent Amendment Act,

WEEK-8 Design Act, Trademark Act, Geographical Indication Act.

UNIT IV DIGITAL PRODUCTS AND LAW

WEEK-9 Digital Innovations and Developments as Knowledge Assets – IP Laws, Cyber Law

WEEK-10 Digital Content Protection – Unfair Competition Meaning and Relationship between Unfair Competition and IP Laws, Case Studies.

WEEK-11 CAT – II

UNIT V ENFORCEMENT OF IPRs

Infringement of IPRs

WEEK 12: Enforcement Measures

WEEK 13: Emerging issues – Case Studies.

WEEK 14: CAT III

TEXT BOOKS:

1. V. Scople Vinod, Managing Intellectual Property, Prentice Hall of India pvt Ltd, 2012
2. S. V. Satakar, —Intellectual Property Rights and Copy Rights, Ess Ess Publications, New Delhi, 2002

REFERENCES:

1. Deborah E. Bouchoux, —Intellectual Property: The Law of Trademarks, Copyrights, Patents and Trade Secrets, Cengage Learning, Third Edition, 2012.
2. Prabuddha Ganguli,Intellectual Property Rights: Unleashing the Knowledge Economy, McGraw Hill Education, 2011.
3. Edited by Derek Bosworth and Elizabeth Webster, The Management of Intellectual Property, Edward Elgar Publishing Ltd., 2013.

SPECIAL ELECTRICAL MACHINES

EE8005

WEEK-1

UNIT I STEPPER MOTORS

Constructional features –Principle of operation –Types – Torque predictions – Linear Analysis

WEEK-2: Characteristics – Drive circuits – Closed loop control

WEEK-3: Concept of lead angle - Applications.

UNIT II SWITCHED RELUCTANCE MOTORS (SRM)

Constructional features –Principle of operation- Torque prediction

WEEK-4: **CAT – I** & Characteristics Steady state performance prediction – Analytical Method
WEEK-5 Power controllers – Control of SRM drive- Sensor less operation of SRM – Applications

UNIT III **PERMANENT MAGNET BRUSHLESS D.C. MOTORS**

Fundamentals of Permanent Magnets - Types- Principle of operation
WEEK-6 Magnetic circuit analysis - EMF and Torque equations
WEEK-7
Power Converter Circuits and their controllers
WEEK-8 Characteristics and control- Applications.

UNIT IV - PERMANENT MAGNET SYNCHRONOUS MOTORS (PMSM)

Constructional features -Principle of operation – EMF and Torque equations
WEEK-9 Sine wave motor with practical windings - Phasor diagram
WEEK-10 Power controllers – performance characteristics -Digital controllers – Applications.
WEEK-11 CAT – II

UNIT V OTHER SPECIAL MACHINES

Constructional features – Principle of operation and Characteristics of Hysteresis motor
WEEK 12: Synchronous Reluctance Motor–Linear Induction motor
WEEK 13: Repulsion motor- Applications
WEEK 14: CAT III

TEXT BOOKS:

1. K.Venkataratnam, Special Electrical Machines, Universities Press (India) Private Limited, 2008.
2. T. Kenjo, Stepping Motors and Their Microprocessor Controls, Clarendon Press London, 1984
3. E.G. Janardanan, Special electrical machines, PHI learning Private Limited, Delhi, 2014.

REFERENCES:

1. R.Krishnan, Switched Reluctance Motor Drives – Modeling, Simulation, Analysis, Design and Application, CRC Press, New York, 2001.
2. T. Kenjo and S. Nagamori, Permanent Magnet and Brushless DC Motors, Clarendon Press, London, 1988.
3. T.J.E.Miller,Brushless Permanent-Magnet and Reluctance Motor Drives, Oxford University Press, 1989.
4. R.Srinivasan, Special Electrical Machines, Lakshmi Publications, 2013.

EE8661 POWER ELECTRONICS AND DRIVES LABORATORY L T P C 0042

.

LIST OF EXPERIMENTS

WEEK 1 : Gate Pulse Generation using R, RC and UJT.

WEEK 2: Characteristics of SCR and TRIAC

WEEK 3: Characteristics of MOSFET and IGBT

WEEK 4:AC to DC half controlled converter

WEEK 5:AC to DC fully controlled Converter

WEEK 6: Step down and step up MOSFET based choppers

WEEK 7: IGBT based single phase PWM inverter

WEEK 8:IGBT based three phase PWM inverter

WEEK 9:AC Voltage controller

WEEK 10: Switched mode power converter.

WEEK 11: Simulation of PE circuits (1Φ & 3Φ semi converters, 1Φ & 3Φ full converters, DC-DC converters, AC voltage controllers).

WEEK 12: Characteristics of GTO & IGCT.

WEEK 13: Characteristics of PMBLDC motor

WEEK 14:MODEL LAB

EE8681 MICROPROCESSORS AND MICROCONTROLLERS LABORATORY

WEEK 1:Simple arithmetic operations: addition / subtraction / multiplication / division.

WEEK 2: Programming with control instructions:
Ascending / Descending order, Maximum / Minimum of numbers.
WEEK 3Programs using Rotate instructions.
Hex / ASCII / BCD code conversions.

WEEK 4:Interface Experiments: with 8085

A/D Interfacing. & D/A Interfacing. 4 Traffic light controller

WEEK 5: I/O Port / Serial communication

WEEK 6: Programming Practices with Simulators/Emulators/open source

WEEK 7:Read a key ,interface display

WEEK 8:Demonstration of basic instructions with 8051 Micro controller execution, including:

WEEK 9:Conditional jumps & looping Calling subroutines.
WEEK 10:Programming I/O Port and timer of 8051
WEEK 11study on interface with A/D & D/A
Week 12Study on interface with DC & AC motors
WEEK 13:Application hardware development using embedded processors.
WEEK 14: MODEL LAB