R.K.D.F. UNIVERSITY, BHOPAL
MTECH (ELECTRICAL AND ELECTRONICS DEPT.)
Semester – I
Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
POWER ELECTRONICS	**ADVANCED MATHAMETICS**	**MTPE-1001**	**3L-1T-0P**	4

Course Outcomes:

CO1 Knowledge gained: • Concept of group action and theorems about group actions. • Structure of permutation groups. • Polynomial rings, EDs, PIDs, & UFDs, and relations among them. • Universality of Polynomial rings

CO2 Skills gained: • Solving problems using the powerful concept of group action. • Facility in understanding the structure of a problem where the problem involves a permutation group - e.g. nature of the roots of a polynomial equation. • Ability to understand a large class of commutative rings by regarding them as quotients of polynomial rings by suitable ideals.

CO3 Knowledge gained: Topological spaces • Connectedness, compactness, separation axioms • Continuity • Metric spaces review • Fundamental groups • Covering spaces • Computations

CO4 Skills gained: Generalization of concepts like continuity • Generalizations of theorems • Distinguishing spaces up to homeomorphisms

CO5 Competency gained: • Understanding of topological spaces and having a grasp on basic results

CO6 Knowledge gained: Metric spaces (in particular, the complex plane). • Analytic functions, Cauchy-Riemann differential equations, harmonic functions

CO7 Competency developed: • Understanding of topological and geometric properties of the complex plane. • Differentiation and integration of functions on C, with applications to problems from real analysis. • Viewing analytic functions as conformal mappings

CO8 Knowledge gained: • Matrix theory, determinants and their application to systems of linear equations. • Eigenvalues, diagonalization of matrices and reduction of systems of linear equations into simpler systems of easily tractable nature. • Vector theory: subspace, basis, linear independence, inner product spaces etc. • Applications of matrix algebra.

Course Contents:

UNIT I

Solution of Partial Differential Equation (PDE) by separation of variable method, numerical Solution of PDE (Laplace, Poisson's, Parabola) using finite difference methods, Elementary Properties of FT, DFT, WFT, Wavelet transform, Haar transform.

UNIT II

Probability, compound probability and discrete random variable. Binomial, Normal, Poisson's distribution. Sampling distribution, elementary concept of estimation and theory of hypothesis, recurred relations.

UNIT III

Stochastic process, Markov process transition probability transition probability matrix, just and higher order

Markov process, Markov chain. Queuing system, transient and steady state, traffic intensity, distribution queuing system, concepts of queuing models (M/M/1: Infinity/ Infinity/ FC FS), (M/M/1: N/ Infinity/ FC FS), (M/M/S: Infinity/ Infinity/ FC FS)

UNIT IV

Operations of fuzzy sets, fuzzy arithmetic & relations, fuzzy relation equations, fuzzy logics. MATLAB introduction, programming in MATLAB scripts, functions and their application.

UNIT V

Introduction and definition of reliability, derivation of reliability functions, Failure rate, Hazard Rate, mean time t future & their relations, concepts of fault tolerant analysis, Elementary idea About decision theory and goal programming.

Reference Books:

1. Higher Engineering Mathematics by B.V. Ramana, Tata Mc Hill.
2. Advance Engineering Mathematics by Ervin Kreszig, Wiley Easten Edd.
3. Applied Numerical Methods with MATLAB by Steven C chapra, Tata Mc Graw Hill.
4. Introductory Methods of Numerical Analysis by S.S. Shastry,
5. Introduction of Numerical Analysis by Forberg
6. Numerical Solution of Differential Equation by M. K. Jain
7. Numerical Mathematical Analysis By James B. Scarborogh
8. Fourier Transforms by J. N. Sheddon
9. Fuzzy Logic in Engineering by T. J. Ross
10. Fuzzy Sets Theory & its Applications by H. J. Zimmersoms

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MTECH (ELECTRICAL AND ELECTRONICS DEPT.)
Semester – I
Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
POWER ELECTRONICS	**ADVANCED CONTROL SYSTEM**	**MTPE-1002**	**3L-1T-0P**	4

Course Outcomes:

CO1 Linearize the non linear physical systems.

CO2 Study the non linear system behavior by phase plane and describing function methods

CO3 Study the stability of linear and nonlinear systems by Lyapunov method.

CO4 Design IMC with Uncertainty and Disturbances

CO5 Represent any system in any canonical form.

CO6 Determine response of system

CO7 Design Lead, Lag and Lead – lag compensator using frequency domain method or time domain method

CO8 Design PID compensator

Course Contents:

UNIT I

Review of Linear Control System: Modeling through differential equations and difference equation, state space method of description and its solution, discretization of continuous time state space model, Laplace and z-domain analyses of control systems, Controllability, operability& Stability, Dode & Nyquist analysis, Root Loci, Effect of load disturbance upon control actions.

UNIT II

Development of feedback control laws through state space technique modal control, pole placement problem.

UNIT III

Variable Structure control and its applications. Examples on variable structure control.

UNIT IV

Control of nonlinear dynamics: Lyapunov based control function, Phase plane technique,Liapunov stability analysis.

UNIT V

Optimal control: Calculus of variation, Euler-Lagrange equations, Boundary conditions, Transversal condition Bolza problem, Ponytail's maximum principle.

Reference Books

1. Automatic Control System – B.C. Kuo, Prentice Hall, New York, 1975
2. Modern Control Engineering K. Ogata, Prentice Hall of India Ltd. New Delhi, 1992
3. Digital control system B.C. Kuo Oxford Pub.
4. Discrete Time Control Systems – K. Ogata. Prentice Hall of India Ltd. New Delhi.
5. Optimum System Control Andrew P. Sage, Prentice Hall New York, 1970

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MTECH (ELECTRICAL AND ELECTRONICS DEPT.)
Semester – I
Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
POWER ELECTRONICS	**Forced Commutation Circuits**	**MTPE-1003**	**3L-1T-2P**	4

Course Outcomes:

CO1 Acquire knowledge about fundamental concepts and techniques used in power electronics.

CO2 Ability to analyze various single phase and three phase power converter circuits and understand their applications

CO3 Foster ability to identify basic requirements for power electronics based design application.

CO4 To develop skills to build, and troubleshoot power electronics circuits

CO5 Foster ability to understand the use of power converters in commercial and industrial applications

CO6 To understand and acquire knowledge about various power semiconductor devices.

CO7 To prepare the students to analyze and design different power converter circuits.

CO8 AC Voltage Controllers: Principle of phase control, Principle of integral cycle control, single phase ac voltage controller with R load and RL load

Course Contents:

UNIT I

Inverter principles, Commutation techniques. Different types of single phase and three phase inverters, voltage control techniques.

UNIT II

Current sourced and voltage sourced inverters, Waveform synthesis, voltage Frequency and phase sequence control, voltage and current relations, Harmonics study.

UNIT III

Principles and classification of chopper circuits, analysis of practical choppers for single two and four quadrant operation, Device selection, Control circuits, Switch mode power supplies, Square wave switching, Resonant mode operation of power supplies,Ferroresonant, Linears and the switchers.

UNIT IV

Induction heating, induction welding and Melting. Application to Dielectric heating. Medium frequency supplies for induction heating, high frequency sources for fluorescent lamps. R.F.generators, Laser power supply.

UNIT V

Power supplies for SRM drive, power supplies for AC and DC drives, Device ratings, Device Data sheets. Safe operating areas. Control circuits.

BOOKS:

1. Power Electronics M.H. Rashid
2. Power Electronics Ned Mohan
3. Power Electronics P.C. Sen
4. Hand book of Power Electronics M.H. Rashid
5. Power Electronics M.D. Singh

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MTECH (ELECTRICAL AND ELECTRONICS DEPT.)
Semester – I
Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
POWER ELECTRONICS	**Power Electronics Devices and Phase controlled circuits**	**MTPE-1004**	**3L-1T-0P**	4

Course Outcomes:

CO1 Relate basic semiconductor physics to properties of power devices, and combine circuit mathematics and characteristics of linear and non-linear devices.
CO2 Describe basic operation and compare performance of various power semiconductor devices, passive components and switching circuits
CO3 Design and Analyze power converter circuits and learn to select suitable power electronic devices by assessing the requirements of application fields
CO4 Formulate and analyze a power electronic design at the system level and assess the performance.

CO5 Identify the critical areas in application levels and derive typical alternative solutions, select suitable power converters to control Electrical Motors and other industry grade apparatus
CO6 Recognize the role power electronics play in the improvement of energy usage efficiency and the applications of power electronics in emerging areas.

Course Contents:

UNIT I

Review of power switching devices i.e. Thyristor, MOSFET, GTO, IGBT, BJT,MCTS. Trigger techniques optical isolator, protection circuit, isolation transformer Natural and forced commutation of SCR.

UNIT II

Phase controlled rectifier configuration. Control of output voltage by sequence and sector control. Reduction on harmonics using multiple pulse control, design of rectifier circuit. Comparative aspects of design using convertor transformer forced sell turn off devices. Design of Chopper circuit, reduction of harmonic circuit, multiphase choppers. Analysis of rectifier and chopper circuit.

UNIT III

Single phase and three phase controllers. Triggering techniques. Concept of dual converters. Circulating and non circulating current. Mode of operation. Regenerative braking

UNIT IV

Concepts of three phase to single phase and three phase to three phase cycloconverter. Symmetrical and asymmetrical control. Harmonic analysis of output voltage.

UNIT V

Line commutated inverters, Margin angle, HVDC, Converter reactions on load side and source side.

BOOKS:

1. Power Electronics M.H. Rashid
2. Power Electronics Ned Mohan
3. Power Electronics P.C. Sen
4. Hand book of Power Electronics M.H. Rashid
5. Power Electronics M.D. Singh

R.K.D.F. UNIVERSITY, BHOPAL
MTECH (ELECTRICAL AND ELECTRONICS DEPT.)
Semester – I
Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
POWER ELECTRONICS	**ELECTRICAL DRIVE**	**MTPE-1005**	**3L-1T-2P**	6

Course Outcomes:

CO1 Examine various applications in industrial and domestic areas where use of electric drives are essential.

CO2 Classify types of electric drives systems based on nature of loads, control objectives, performance and reliability

CO3 Combine concepts of previously learnt courses such as, electrical machines, Control and power electronics to cater to the need of automations in industries

CO4 Select most suitable type and specification of motor drive combination for efficient conversion and control of electric power

CO5 Design and justify new control and power conversion schemes for implementing alternative solutions considering the critical and contemporary issues.

CO6 Identify the critical areas in application levels, and derive typical solutions

CO7 Effect of starting on Power supply, motor and load. Methods of stating of electric motors. Acceleration time Energy relation during stating, methods to reduce the Energy loss during starting.

CO8 Types of braking, braking of DC motor, Induction motor and Synchronous motor, Energy loss during braking,

Course Contents:

UNIT I

Introduction: concept of electric drives, types of drives, speed torque characteristics of various electric drives. Starting methods for DC shunt and series motor and three phase induction and synchronous motors, expressions for starting current and starting torque. Electric braking of electric drives, types of braking, speed torque characteristics of electric drives under braking conditions. Reversal of electric drives.

UNIT II

Speed control: fundamental parameters of speed control of dc motors. Field control and armature control characteristic constant torque and constant HP Characteristics a.c. motors variable frequency pole changing variable resistance in stator and rotor circuit, voltage injection in the rotor circuit characteristics.

UNIT III

Transient condition basic concept regarding transients in drives analysis of transient condition during starting braking reversal and sudden loading of dc drives energy involved in transient process analysis of transient behavior of the phase induction drive while starting and braking.

UNIT IV

Solid state control advantage of using solid state control drives in industrial field principle of working block diagram and characteristics obtained in dc shunt, series and compound motors. Three phase induction and synchronous motor for adjustable speed drives.

UNIT V

Estimation of motor rating and drive selection: types of duty cycles calculation of motor rating for various duty cycles load diagram. Load equalization flywheel calculations permissible frequency of starting of squirrel cage motor general consideration in selection of drive for industrial applications.

BOOKS:

1. Ned Mohan, T.M. Undeland, W.P. Robbins, Power Electronics-Converters, Applications and design", John Wiley & Sons.
2. J.M.D. Murphy, F.O. Turnbull, "Power Electronic Control of AC motors", Pergamon Press.
3. P.C. Sen, D.C. drive, Pergamon Press
4. B.K. Bose, Power Electronics & AC drive prentice Hall.
5. Dubey G.K. "Power semi Conductor controller drives, Prentice Hall.
6. Vedam Subramanyam, "Electrical Drives".
7. T.J.E. Miller, Switched Reluctance & P.M. B.L. DC motor, Pergamon Press

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MTECH (ELECTRICAL AND ELECTRONICS DEPT.)
Semester – II
Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
POWER ELECTRONICS	Power Electronic App.To Power System	MTPE-2001	3L-1T-0P	4

Course Outcomes:

CO1 Acquire in-depth knowledge in the domain of power systems. To understand the impact of engineering solutions in a global, economic, environmental and societal context.
CO2 Ability to critically analyze various power system components, models and their operation

CO3 Ability to apply fundamentals and concepts to analyze, formulate and solve complex problems of electrical power systems and its components
CO4 Apply advanced concepts of electrical power engineering to analyze, design and develop electrical components, apparatus and systems to put forward scientific findings at national and international levels
CO5 Ability to use advanced techniques, skills and modern scientific and engineering tools for professional practice
CO6 Preparedness to lead a multidisciplinary scientific research team and communicate effectively

CO7 Demonstrate and apply knowledge and understanding of engineering principles for project management
CO8 To motivate exploring ideas and to encourage for independent, reflective and lifelong learning

Course Contents:

UNIT I

Power System components models formation of bus admittance matrix, algorithm for formation of bus impedance matrix. Reactive power capability of an alternator, transmission line model & load ability, Reactive power transmission & associated difficulties, Regulated shunt compensation, Models of OLTC & Phase shifting transformer, load flow study.

UNIT II

Sensitivity analysis: Generation shift distribution factors, line outage distribution factors, Compensated shift factors. Power systems security levels, contingency selection & evaluation, security constrained economic dispatch. Pre-contingency corrective rescheduling.

UNIT III

Voltage stability: Proximity indicators e.g. slope of PV curve, Minimum Eigen value of reduced load flow Jacobian participation factors based on modal analysis and application.

UNIT IV

Flexible ac transmission system, reactive power control, brief description and definition of FACT’s controllers,

shunt compensators, configuration and operating characteristics of TCR, FC-TCR, TSC, Comparisons of SVCs.

UNIT V

Thyristers controlled series capacitor (TCSC) Advantages of the TCSC, Basic principle and different mode of operation, analysis variable reactance model and transient stability model of TCSC.

Reference Books

1. Modern power system analysis D.P. Kothari, I.J. Nagrath, TMH, 2003
2 Power generation operation and contrl A.J. Wood, B.F. Woolenberg, jhonwieldy, 1996
3. Understanding facts: Concepts and technologies of flexible AC transmission system IEEE Press,2001 N.G. Hingorani, L. Gyugyi
4. Power system stability and control IEEE press P. Kundur, 1994
5. Thyristor Based FACTS controllers for electrical Transmission systems- R.M. Mathur, R.K. Verma, Wieldy Inter science, 2002

MTECH (ELECTRICAL AND ELECTRONICS DEPT.)
Semester – II
Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
POWER ELECTRONICS	**Solid State controllers of Drives**	**MTPE-2002**	**3L-1T-0P**	4

Course Outcomes:

CO1 understand the operation of the converter / chopper fed dc drive and to solve simple problems

CO2 understand the operation of both classical and modern induction motor drives

CO3 apply this skills to design the current and speed controllers for a closed loop solid-state DC motor drive

CO4 understand the concept of AC AND DC drive system

CO5 discriminates to drive the systems required for special machines

CO6 To understand the stable steady-state operation and transient dynamics of a motorload system.

CO7 To study and analyze the operation of the converter / chopper fed dc drive and to solve simple problems

CO8 To understand the differences between synchronous motor drive and induction motor drive and to learn the basics of permanent magnet synchronous motor drives

Course Contents:

UNIT I

Microprocessor based control of converters such as rectifiers. Chopper.

UNIT II

Microprocessor based control of Inverters cyclo-converters. Use of PLL

UNIT-III

Field oriented control (Vector control) and programmable controllers for three phase drives. Steady state and transient analysis of phase controlled converter fed and chopper fed DC drives torque speed curves.

UNIT-IV

Steady state and transient analysis of three phase induction motor drives(i) Variable stator voltage control (ii) Variable frequency controls (iii) V/F control(iv) slip recovery scheme (v) Vector control. Torque speed curves.

UNIT-V

Steady state and transient analysis of three-phase synchronous motor drives(i) VSI and CSI fed PWM controlled drive (ii) True mode and self control mode of tion scheme (iv) Switched Reluctance scheme. Operation (iii) Brushless torque speed curves.

BOOKS:

(1) Ned Mohan, T.M. Undeland, W.P. Robbins, Power Electronics-Converters, Applications and

design",John Wiley & amp; Sons.
(2) J.M.D. Murphy, F.O. Turnbull, "Power Electronic Control of AC motors", Pergamon Press.
(3) P.C. Sen, D.C. drive, Pergamon Press
(4) B.K. Bose, Power Electronics & amp; AC drive prentice Hall.
(5) Dubey G.K. "Power semi Conductor controller drives, Prentice Hall.
(6) Vedam Subramanyam, "Electrical Drives".

Semester – II
Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
POWER ELECTRONICS	**Modeling and Simulation of Drives**	**MTPE-2003**	**3L-1T-0P**	4

Course Outcomes:

CO1 Exhibit knowledge of basic sciences and engineering and manufacturing processes.

CO2 Demonstrate the ability to accomplish the integration of systems using appropriate analytical, computational and application practices and procedures.

CO3 Demonstrate the ability to apply knowledge of probability and statistics, optimization techniques, simulation modeling, engineering economic analysis and cost control, and other technical sciences and specialties necessary in the field of industrial engineering and management

CO4 Be able to identify, formulate, solve problems and implement solutions for engineering, managerial and societal requirements

CO5 Possess skills related to design / re-design and conduct experiments, analyze and interpret data through systems thinking and modeling approaches

CO6 Exhibit knowledge of values and professional ethics in their areas of work

CO7 Develop an ability to adapt and continuously learn to pursue successful careers in chosen professional field

CO8 Manage projects in various sectors of economy with a focus on conceptual, technical and human aspects

Course Contents:

UNIT I

Mathematical modeling of electrical machines, Reference frame theory, Transformation of variables between reference frames, analysis of AC and DCmachine Linearised equations of AC and DC machine.

UNIT II

Stability analysis Four Quadrant operation of Drive, Motor characteristics thermal effects in electrical machines, Rating, Selection of motor and its size.

UNIT III

Open loop and closed loop control of converter and chopper fed DC motors.

UNIT IV

Analysis of CSI and VSI fed AC drive, Generalized operation of induction motor with impressed voltage of non sinusoidal waveform, analysis using equivalent circuit harmonic losses, Derating, Scalar Control of induction motor drives Variable frequency synchronous motor drive, concept of vector control of AC drives.

UNIT V

MATLAB simulation of DC AC machines and drives system.

BOOKS

1. Power Electronics & Drives - B.K. Bose
2. Electrical machines and Converters- Modelling and simulation H.Buyse, I.J. Robert
3. Thyristor control of Electrical Drive - V. Subrahmanyam
4. Thyristor DC Drives- P.C. Sen
5. Analysis of Electrical Machine- P.C. Krause

Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
POWER ELECTRONICS	**Advanced Microprocessor and Application**	**MTPE-2004**	**3L-1T-0P**	4

Course Outcomes:

CO1 Understand the necessity, features and architecture of 8086.

CO2 Analyse the addressing modes and understand the functions of 8086 instructions

CO3 Write simple assembly language programs

CO4 Understand the need and handling of interrupts in 8086 and features of peripheral IC

CO5 Explain the architecture of generic advanced microprocessor and features of advanced microprocessors

CO6 Understand the need and features of bus standards.

CO7 Teacher is expected to observe and record the progress of students' activities; Assessment shall be made based on the following rubrics table

CO8 Know the features of advanced microprocessors.

Course Contents:

UNIT I

Review of basic microprocessor and microcomputer concepts and the architecture and instruction set of a typical 8 bit microprocessor.

UNIT II

ADVANCED PROCESSORS: - Over view of 16-bit/32-bit/64 bit Intel based microprocessors. Arithmetic and I/O co-processor architecture. Register details, operation-addressing modes &instruction set of a typical 16-bit microprocessor assembly language programming
for the processor introduction to multiprocessing.

UNIT III

PROGRAMMIABLE SUPPORT CHIPS :- Programmable parallel interface chip (e.g. 8255) functional schematic. Pin function operating mode interface with microprocessor chip programming serial communication interface chip (e.g. 8251) functional schematic pin function.
Operating mode interface with processor mode and command words for the chip programmable interrupt controller (8259) functional schematic pin function single and cascaded operation interface with microprocessor and I/O devices
Programmable interval timer (8253) functional schematic pin functions. Modes of operations.

UNIT IV

ANALOG INPUT AND OUTPUT :- Microprocessor compatible ADC & DAC chips interfacing ADC with multiplexer with ADC,microprocessor use of sample and hold circuit interfacing DAC with microprocessor.

UNIT V

MICROCONTROLLER: - Hardware and software integration in microprocessor control system. An overviewof 8-bit microcontroller architecture and instruction set.
CASE STUDY :- Example of microprocessor application: Data acquisition system open loop closeloop controller

BOOKS:

1. Advanced Microprocessor A.K.Ray, K.M.BhurchandiTMH
2. Microprocessor Gaonkar
3. Microprocessor, Hardware & Programming Douglas V Hall

Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
POWER ELECTRONICS	**Power Quality and Conditioning**	**MTPE-2005**	**3L-1T-2P**	6

Course Outcomes:

CO1 Explain the importance of Power Quality

CO2 Describe about power quality problems, categories, causes and its effects

CO3 Interpret the role of power quality standards and charts

CO4 Demonstrate the various types of linear and nonlinear loads

CO5 Summarize Power Conditioning devices and Power Quality Monitoring systems.

CO6 According to load aspect, it is defined as the power supplied for satisfactory performance of all equipment i.e., all sensitive equipment.

CO7 In IEEE dictionary, power quality is defined as "the concept of powering and grounding sensitive equipment in a matter that is suitable to the operation of that equipment

CO8 This depends upon the end user. According to end user point of view, it is defined as, any power problem manifested in voltage, current, or frequency deviations that result in failure or mis operation of customer equipment

Course Contents:

UNIT I

Understanding Power quality, types of power quality disturbances, power quality indices, Causes and effects of power quality disturbances

UNIT II

Causes and effects of harmonics, converter configuration and their contribution to supply harmonics, other sources of harmonics

UNIT III

Radio interference, supply standards, elimination/suppression of harmonics, classical solutions& their drawbacks, passive input filters, design of harmonic filters, Improved power quality converter topologies, (single and three phase),transformer connections, Elimination/suppression of harmonics using active power filters – topologies, and their control methods, PWM converter as a voltage source active filter, current source active filter,

UNIT IV

Active wave shaping of input line current, constant frequency control, constant tolerance band control, variable tolerance band control, discontinuous current control,Electromagneticinterference(EMI), EMI generation ,EMI standards, and elimination.

Reference Books:

1. Power Quality – by R.C. Duggan
2. Power system harmonics – by A.J. Arrillga
3. Power electronic converter harmonics – by Derek A. Paice

4. Power Electronics –Mohan,Undeland,Robbins

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
POWER ELECTRONICS	**Micro Controllers and Control**	**MTPE-3001**	**3L-1T-0P**	4

Course Outcomes:

CO1 Explain the internal organization and operation of microprocessors/microcontrollers.

CO2 Program 8086 Microprocessor, 8051 and PIC Microcontrollers for application specific solution

CO3 Design microprocessors/microcontrollers-based systems

CO4 Implement and develop new experiments on microprocessor/microcontroller based systems.

CO5 Understand the need and features of bus standards.

CO6 Explain microcontroller application and basic architecture of PIC,ARM and ATMEGA processors.

CO7 Know the internal organization, addressing modes and instruction sets of 8085 processor

CO8 Understand embedded C and assembly language program by using 8051 Instruction sets and addressing modes

Course Contents:

UNIT I

Introduction: Overview of microcontroller 8031, 80196 and latest microcontroller developments architecture of 8051 instructions set. Assembly language programming to8051Inside the 8051 introduction to 8051 assembly programming assembling and running of 8051 program data types and directives flag bits and PSW register. Register bank and stack jump loop and call instructions addressing modes.

UNIT II

Program development Program development using arithmetic instruction logical instruction single bit instruction I/O programming interrupts programming timer counterprogramming.

UNIT III

Microcontroller interfacing Interfacing to LCD ADC DAC chip stepper motor key board

UNIT IV

Introduction overview of DSP and its latest development, architecture, instruction set and applications.

References:

1 K.J. Ayala, The 8086 microprocessor : programming and interfacing the PC, Pen ramInternational.
2. K.J. Ayala, The 8051 microcontroller: Architecture, programming and applications,Pen ram Int.
3. Raj Kamal, The concepts and features of microcontrollers (68H11, 8051 & 8096),Wheeler publishing.
4. Douglas Hall, Microprocessor & Interfacing, TMH
5. 8051 Microcontroller and Embedded System-Maz

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
POWER ELECTRONICS	**EHV AC and DC Transmission**	**MTPE-3002**	**3L-1T-0P**	4

Course Outcomes:

CO1 Develop the knowledge of HVDC transmission and HVDC converters and the applicability and advantage of HVDC transmission over conventional AC transmission.

CO2 . Formulate and solve mathematical problems related to rectifier and inverter control methods and learn about different control schemes as well as starting and stopping of DC links

CO3 Analyze the different harmonics generated by the converters and their variation with the change in firing angles.

CO4 Develop harmonic models and use the knowledge of circuit theory to develop filters and assess the requirement and type of protection for the filters.

CO5 Study and understand the nature of faults happening on both the AC and DC sides of the converters and formulate protection schemes for the same.

CO6 Review the existing HVDC systems along with MTDC systems and their controls and recognize the need to follow the advancements in both the existing systems and HVDC systems and determine the most economic coexistence of both.

CO7 Introduction of DC power transmission technology

CO8 Generation of harmonics by converters, characteristics of harmonics on DC side, characteristics of current harmonics

Course Contents:

UNIT I

Constitution of EHV a.c. and D.C. links, Kind of d.c. links, Limitations and Advantages of a.c. and d.c. transmission, Principal application of a.c. and d.c. transmission, Trends in EHV a.c. and d.c. Transmission, Power handling capacity. Converter analysis garrets circuit, firing angle control, over lapping.

UNIT II

Extra long distance lines, Voltage profile of loaded and unloaded line along the line, Compensation of lines, Series and shunt compensation, Shunt reactors, Tuned power lines. Problems of Extra long compensated lines, FACT concept and application.

UNIT III

Travelling waves on transmission systems, Their shape, Attenuation and distortion, effect of junction and termination on propagation of traveling waves. Over voltages in transmission system. Lightning, switching and temporary over voltages: Control of lighting and switching over voltages.

UNIT I

Components of EHV d.c. system, converter circuits, rectifier and inverter valves, Reactive power requirements, harmonics generation, Adverse effects, Classification, Remedial measures to suppress, filters, Ground return. Converter faults & protection harmonics misoperation, Commutation failure, Multiterminal D.C. lines.

UNIT I

Control of EHV d.c. system desired features of control, control characteristics, Constant current control, Constant extinction angle control. Ignition Angle control. Parallel operation of HVAC & DC system. Problems & advantages.

Reference Books:

(1) Begmudre, EHV AC Transmission.
(2) S. Rao, EHV AC & DC Transmission.
(3) Kimbark, HVDC Transmission.
(4) Arrillaga, HVDC Transmission.
(5) Padiyar, HVDC Transmission.

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
POWER ELECTRONICS	**Dissertation Part- I (Literature Review/Problem Formulation/ Synopsis**	**MTPE-3003**	**0L-0T-2P**	**2**

Course Outcomes: After studying this course, students will be able to,

CO1- To define and limit of the research.

CO2- To place your study in an historical perspective.

CO3- To avoid unnecessary duplication.

CO4- To evaluate promising research methods.

Course Content

The objective of Dissertation Part-I is to promote a systematic understanding of the knowledge, critical awareness of current problems, originality in the application of knowledge and the quality of work. The ideal work may be characterized by a new result in design, development and implementation. It should have the potential of industrial/scientific acceptance. The first part of the Dissertation should be to determine the interest of students and broadly identify the area of work, finalize the research problem based on literature survey. Also, by now the students should have familiarity with the concepts, tools, techniques required to carry out the Dissertation work. Student is expected to start the research work. Outcome of Dissertation Part-I should be to conclude the work on the identified problem its importance, its justification, literature survey, field work, research work etc. Minor variation may be accepted depending upon nature of title.

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
POWER ELECTRONICS	**Dissertation Part- II**	**MTPE-4001**	**0L-0T-2P**	**2**

Course Outcomes: After studying this course, students will be able to,

CO1- The programme of instruction will consist of advanced subjects of the respective specialization. The complete programme is distributed over four semesters with two semesters per academic year. Course work is offered in the first two semesters (except for PG programme in Mechanical engineering where it is extended up to third semester) and the dissertation work will be carried out during third and fourth semesters. Every branch of M.E/ M. Tech programme will have a curriculum and syllabi for the courses recommended by the board of studies and approved by the academic council. The academic programmes of the Institute follow the credit system.

CO2- Every candidate shall be required to submit the record of dissertation work at the end of fourth semester.

Course Content

The objective of Dissertation Part-I is to promote a systematic understanding of the knowledge, critical awareness of current problems, originality in the application of knowledge and the quality of work. The ideal work may be characterized by a new result in design, development and implementation. It should have the potential of industrial/scientific acceptance. Dissertation Part-II should be seen in continuation with Dissertation Part-I. The researcher should continue the research work in the two parts.