SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

Grading
M.Tech Power Electronics
Scheme of Examination w.e.f. 2016-17
I-Semester / I-Year

S. No.	Subject Code	Subject Name	Maximum Marks Allotted						Hours/ Week			Credit	Total Marks
			Theory			Practical							
			End Sem.	Mid Sem	Quiz, Assignment	End Sem	Lab work	Assignment / Quiz	L	T	P		
1	MTPE 101	ADVANCE MATHEMATICS	100	30	20				3	1		4	150
2	MTPE 102	POWER ELECTRONICS DEVICE & PHASE CONTROLLED CIRCUITS	100	30	20				3	1		4	150
3	MTPE 103	ADVANCE CONTROL SYSTEM	100	30	20				3	1		4	150
4	MTPE 104	FORECD COMMUTATION CIRCUITS	100	30	20				3	1		4	150
5	MTPE 105	ELECTRICAL DRIVES	100	30	20				3	1		4	150
6	MTPE 106	LAB-I (POWER ELEX DEVICE & PHASE CONTROLLED CKT)				50	50				4	2	100
7	MTPE 107	LAB-II (SOFTWARE & SIMULATION)				50	50				4	2	100
8	MTPE 108	COMPREHENSIVE VIVA-I				50					4	2	50
TOTAL			500	150	100	150	100		15	5	12	26	1000

L: Lecture T: Tutorial P: Practical

SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

Grading
M.Tech Power Electronics
Scheme of Examination w.e.f. 2016-17
II-Semester / I-Year

S. No.	Subject Code	Subject Name	Maximum Marks Allotted						Hours/ Week			Credit	Total Marks
			Theory			Practical							
			End Sem.	Mid Sem	Quiz, Assignment	End Sem	Lab work	Assignment / Quiz	L	T	P		
1	MTPE 201	POWER ELECTRONICS APP. TO POWER SYSTEMS	100	30	20				3	1		4	150
2	MTPE 202	MODELING & SIMULATION OF DRIVES	100	30	20				3	1		4	150
3	MTPE 203	POWER QUALITY & CONDITIONING.	100	30	20				3	1		4	150
4	MTPE 204	ELECTIVE-I	100	30	20				3	1		4	150
5	MTPE 205	ELECTIVE-II	100	30	20				3	1		4	150
6	MTPE 206	LAB-III (POWER ELECTRONICS APP. TO POWER SYSTEMS LAB)				50	50				4	2	100
7	MTPE 207	LAB-IV (MODELING & SIMULATION LAB)				50	50				4	2	100
8	MTPE 208	COMPREHENSIVE VIVA-II				50					4	2	50
TOTAL			500	150	100	150	100		15	5	12	26	1000

L: Lecture T: Tutorial P: Practical

ELECTIVE-I		ELECTIVE-II	
MTPE 204(A)	Solid State controllers of Drives	MTPE205(A)	Computer Aided Power Electronics Analysis & Design
MTPE 204(B)	Power Electronics Supply System & Design	MTPE205(B)	EHV AC & DC Transmission
MTPE 204(C)	Non Conventional Energy Sources & Energy Converters	MTPE205(C)	Advanced Microprocessor & Applications

SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

Grading
M.Tech Power Electronics
Scheme of Examination w.e.f. 2016-17
III-Semester / II-Year

S. No.	Subject Code	Subject Name	Maximum Marks Allotted						Hours/ Week			Credit	Total Marks
			Theory			Practical							
			End Sem.	Mid Sem	Quiz, Assignment	End Sem	Lab work	Assignment / Quiz	L	T	P		
1	MTPE 301	DISSERTATION (PHASE-I)				100	100					12	200
						100	100					12	200

L: Lecture **T: Tutorial** **P: Practical**

SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

Grading
M.Tech Power Electronics
Scheme of Examination w.e.f. 2016-17
IV-Semester / II-Year

S. No.	Subject Code	Subject Name	Maximum Marks Allotted						Hours/ Week			Credit	Total Marks
			Theory			Practical							
			End Sem.	Mid Sem	Quiz, Assignment	End Sem	Lab work	Assignment / Quiz	L	T	P		
1	MTPE 401	DISSERTATION (PHASE-II)				150	150					12	300
						150	150					12	300

L: Lecture **T: Tutorial** **P: Practical**

MTPE 101- ADVANCE MATHEMATICS

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 - IV

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.

MTPE 102 - POWER ELECTRONICS DEVICES AND PHASE CONTROLLED CIRCUITS

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.

Reference 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.

MTPE 103 - ADVANCED CONTROL SYSTEM

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, Diode & 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, Lyapunov stability analysis.

UNIT - V

Optimal control: Calculus of variation, Euler-Lagrange equations, Boundary conditions, Transversal condition Bolza problem, Pontyazin'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.
6. Advanced Control System- B.S.Manake, Khanna Publication.

MTPE 104 - FORCED COMMUTATION CIRCUITS

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, and Device Data sheets, Safe operating areas, Control circuits.

Reference 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.

MTPE 105 - ELECTRICAL DRIVES

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.

Reference 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 • B.K. Bose, Power Electronics & AC drive prentice Hall.
4. Dubey G.K. "Power semi Conductor controller drives, Prentice Hall.
5. Vedam Subramanyam, "Electrical Drives".
6. T.J.E. Miller, Switched Reluctance & P.M. B.L. DC motor, Pergamon Press.

MTPE 201 - POWER ELECTRONICS APP. TO POWER SYSTEM

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 Jacobean 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

Thyristors 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.

MTPE 202 - MODELING AND SIMULATION OF DRIVES

UNIT - I

Mathematical modeling of electrical machines, Reference frame theory, Transformation of variables between reference frames, analysis of AC and DC machine Line arise 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

Reference 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.

MTPE 203 - POWER QUALITY AND CONDITIONING

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, Electromagnetic interference(EMI), EMI generation ,EMI standards, and elimination.

UNIT - V

Power quality conditioners: Shunt and series compensators, Dstatcom-dynamic voltage restorer, unified power quality conditioners

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.

MTPE 204(A) - SOLID STATE CONTROLLERS OF DRIVES

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 (iii) Brushless e Torque speed curves (iv) Switched Reluctance scheme. Operation

Reference 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. P.C. Sen, D.C. drive, Pergamon Press.
3. B.K. Bose, Power Electronics & amp; AC drive prentice Hall.
4. Dubey G.K. "Power semi Conductor controller drives, Prentice Hall. Vedam Subramanyam, "Electrical Drives".
5. T.J.E. Miller, Switched Reluctance & P.M. B.L. DC motor, Pergamon Press.

MTPE 204(B) - POWER ELECTRONICS SUPPLY SYSTEM AND DESIGN

UNIT - I

Review of basic power electronics principles Introduction to various power electronics supplies Performance parameters for power electronics supplies and their measurements.

UNIT - II

DC to DC converters: Analysis and design of buck, boost, buck- boost and cuk converters, two quadrant and full bridge converters Isolated converters i.e. fly back, forward and bridge topology Design of d.c. inductor Concept of integrated magnetic, converter control, average model, state- space model.

UNIT - III

DC controlled AC: Controlled inversion, three phase full wave inverters. 180° mode and 120° mode operation, harmonic analysis, PWM control of VSI, current mode control of PWM VSI, space vector modulation, three phases current sourced PWM CSI, design and simulation.

UNIT - IV

AC Choppers: Modeling and analysis of AC choppers, harmonic control using symmetrical and asymmetrical waveform pattern, design and simulation.

UNIT - V

Soft switching DC to DC converters, zero current switching topologies, zero voltage switching topologies, generalized switching cell, ZCT and ZVT DC converters, design and simulation.

Reference Books

1. Power Electronics Circuits, Issa Batarseh, John Wiley & Sons Inc., 2004.
2. Power Electronics: Converters, Applications, and Design, Ned Mohan, John Wiley & Sons Inc., 2001.
3. Power Electronic Systems Theory and Design, Jai P Agrawal, Pearson Education Asia, 2001.
4. Switching Power Supply Design, A I Pressman, McGraw Hill Publication, 1991.
5. Handbook of Power Electronics, M H Rashid.

MTPE 204(C) - NON CONVENTIONAL ENERGY SOURCES AND ENERGY CONVERTERS

Unit - I

Renewable Energy Systems: Energy Sources, Comparison of Conventional and non-conventional, renewable and non-renewable sources, statistics of world resources and data on different sources globally and in Indian context, significance of renewable sources and their exploitation energy planning, Energy efficiency and management.

Unit - II

Wind Energy System Wind Energy, Wind Mills, Grid connected systems, system configuration, working principles, limitations, effects of wind speed and grid conditions, Grid independent systems - wind-battery, wind-diesel, wind-hydro biomass etc. wind operated pumps, controller for energy balance. Small hydro system grid connected system, system configurations, working principles and limitations, effect of hydro potential and grid conditions, synchronous versus induction generators for standalone systems, use of electronic load controllers and self excited induction generators. Wave Energy Systems: System configuration, grid connected and hybrid systems.

Unit - III

Solar Radiation Extraterrestrial solar radiation, terrestrial solar radiation, solar thermal conversion, solar photo tonic systems, Solar cell material and efficiency, Characteristic of PV panels under varying insulation, PV operated lighting and water pumps, characteristics of motors and pumps connected to PV panels. Biomass Energy System: System configuration, Biomass engine driven generators, feeding loads in stand-alone or hybrid modes, Biomass energy and their characteristics.

Unit - IV

Electric Energy Conservation: Energy efficient motors and other equipment: Energy saving in Power Electronic controlled drives, electricity saving in pumps, air-conditioning, power plants, process industries, illumination etc. methods of Energy Audit measurements systems; efficiency measurements, energy regulation, typical case studies, various measuring devices analog and digital, use of thyristers.

Unit - V

Study of typical energy converters such as high performance motor special generators driven by bio gas engines. Wind turbines etc., mini-hydro generators, modern state of the art and futuristic systems in this area.

Reference Books

1. John Twidell & Toney Weir, Renewable Energy Resources, E & F N Spon.
2. El-Wakil, Power Plant Technology, McGraw Hill.
3. Rai G D, Non-conventional Energy Resources, Khanna.
4. F Howard E. Jordan, "Energy-Efficient Electric Motor & their Application-II", Plenum Press, New York, USA.

MTPE 205(A) - COMPUTER AIDED POWER ELECTRONICS ANALYSIS & DESIGN

UNIT - I

Introduction to power electronics simulation, methods of analysis and formulation of system equations.

UNIT - II

Modeling of power electronics system elements, computer formulation of power electronics system equations, review of graph theory.

UNIT - III

Introduction to Spice, Auto sec, Simulink for power electronics converter analysis Introduction to digital optimization, Sequential methods of simulation.

UNIT - IV

Advance techniques for efficient computation. Creation of data files for power semi-conductors, magnetic and capacitors.

UNIT - V

Modeling of stray inductance, Capacitances and connections, Thermal Modeling and heat flow design Analysis under abnormal fault conditions and design of protection circuits.

Reference Books

1. Computer Aided Power Electronics Analysis and design Venkatachari Rajgopal.
2. Power Electronics and AC Drives B. K. Bose.
3. Power Electronics Control Turnbull JMD Murphy & FG.
4. Design of Inductors & Transformers Col. Mc.
5. Manufacturers Catalogue on Rectifiers GE, West.code/International/Ferraz/Prague /Siemens etc.

MTPE 205(B) - EHV AC AND DC TRANSMISSION

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 garetz circuit, Firing angle control, Overlapping.

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, and 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 - IV

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 mis operation, Commutation failure, Multi terminal D.C. lines.

Unit - V

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.

MTPE 205(C) - ADVANCED MICROPROCESSOR AND APPLICATION

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 c command words for the chip programmable interrupt controller (8259) functional schematic pin function single and cascaded operation interface with microprocessor a n d 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 a interfacing DAC with microprocessor.

UNIT - V

MICROCONTROLLER

Hardware and software integration in microprocessor control system. An overview of 8-bit Micro controller architecture and instruction set.

CASE STUDY

Example of microprocessor application: Data acquisition system open loop close loop controller

Reference Books

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