

**SAMRAT ASHOK TECHNOLOGICAL INSTITUTE, VIDISHA**  
(Engineering College)

**Course Contents & Grade**

Branch	Subject Title	Subject Code	Grade for End Sem		End Sem marks
			Theory	Practical	
M.E. Power Electronics I sem.	Power Electronics Devices and Phase Controlled Circuit	MEPE-2211	Theory	Practical	Max 60
			3	--	

**Unit - I**

Review of power switching devices, i.e. thyristors, MOSFET, GTO, IGBT, BJT, MCTS, Triac, Triggering techniques, optical isolator protection circuits, snobbier circuit, isolator transformer.

**Unit -II**

Principle of phase controlled converter operation, single phase semi converter, single phase full converter, effect of source and load inductance, single phase dual converter, single phase series converter, analysis and design of converter circuit.

**Unit- III**

Three phase semi converter, three phase full converter, effect of source and load inductance, three phase dual converter, three phase series converter, analysis and design of three phase converter circuit.

**Unit -IV**

Single phase bidirectional controller, three phase half wave controller, three phase full wave controller, three phase bidirectional delta connected controller, effect of source and load inductance, AC voltage controller with PWM control, design of AC voltage controller.

**Unit -V** Classification of cycloconverter, step up cycloconverter, step down cyclo converter, single phase to single phase cycloconverter, three phase to single phase cycloconverter, three phase to three phase cycloconverter, six pulse cycloconverter.

Reference Books:-

1. Ned Mohan, Tore. M. Undeland, William. P. Rubbins, Power electronics converters, application & design. John Wiley & sons
2. M. H. Rashid, Power electronics circuits, devices and applications. Prentice Hall of India pvt ltd
3. M.H. Rashid, Handbook of power electronics
4. Joseph Vithayathil, Power electronics principles and applications. Mc Graw Hill, NY
5. Cyril W. Lander, Power electronics Mc Graw Hill
6. G.K. Dubey, Dorudla, Joshi and Sinha, Thyristorised power controllers  
New Age International

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**Course Contents & Grade**

Branch	Subject Title	Subject Code	Credits		End Sem Marks
			Theory	Practical	
M.E. Power Electronics I sem..	Industrial & Process instrumentation	MEPE-2212	3	--	Max 60

**Unit 1**

**TRANSDUCER FUNDAMENTALS.**

Review of transducers for non-electrical quantities their characteristics and classification.

**Unit 2**

**TRANSDUCERS FOR INDUSTRIAL MEASUREMENT**

Working principle and characteristics of transducers used for measuring weight, density, vibration, distance, thickness, opacity etc. Working principle of pneumatics, electrical optical magnetic and nucleonic transducers used for measuring pressure, level, temperature, flow, moisture, humidity and pH value.

**Unit 3**

**PROCESS CONTROLLERS**

Introduction to different control concepts like feedback, feed forward cascade etc. steady state analysis dynamic response of linear and nonlinear elements, transient and frequency response analysis of processes with controllers PID controller design (pneumatic and electrical) comparative study of pneumatic and electric controllers.

**Unit 4**

**FINAL CONTROL ELEMENTS**

Selection of instruments for a given process and their placement in the loop instrumentation diagram with standard symbols.

**Unit 5**

Case studies of Design of Instrumentation schemes used in Thermal Pulp and paper plants, sugar and cement industries.

**BOOKS:**

1. Electrical Measurement & Instrumentation By A.K.Sawney
2. Industrial Instrumentation By M.S.Berde
3. Control System By Nagrath, Gopal
4. Control System By B.S.Manake
5. Process control By C.D. Johnson
6. Instrumentation and process automation By S.K. Singh

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			Theory	Practical	
M.E. Power Electronics I sem.	Forced Communication Circuit	MEPE-2213	3	--	Max 60

**UNIT – 1**

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, Ferro resonant.

**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.

**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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Branch	Subject Title	Subject Code	Credits		End Sem Marks
			Theory	Practical	
M.E. Power Electronics I sem.	Electric Drives	MEPE-2214	3	--	Max 60

**UNIT – 1**

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:**

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

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**Course Contents & Grade**

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M.E. Power Electronics I sem..	Power Electronics Application to Power System	MEPE-2215 (A) (Elective-I)	3	--	Max 60

**UNIT I**

General Introduction of power system needs for compensation and its different method, load flow study, load frequency control

**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, jhonwielyd, 1996
3. Understanding facts: Concepts and technologies of flexible AC transmission systemIEEE 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, Wiely Inter science, 2002