Electronics & Telecommunication Engineering Department
List of Professional Elective courses

New Professional Elective Course Codes	
ET3051	Biomedical Instrumentation 3+0+0
ET3052	Lab: Biomedical Instrumentation 0+0+1
ET3053	Mobile Communication 3+0+0
ET3054	Lab: Mobile Communication 0+0+1
ET3055	Information Theory & Coding 3+0+0
ET3056	Lab: Information Theory & Coding 0+0+1
ET3057	Digital System Design 3+0+0
ET3058	Lab: Digital System Design 0+0+1
ET3059	Industrial Automation 3+0+0
ET3060	Lab: Industrial Automation 0+0+1
ET3061	Object Oriented Programming 3+0+0
ET3062	Lab: Object Oriented Programming 0+0+1
ET4151	Robotics 3+0+0
ET4152	Lab: Robotics 0+0+1
ET4053	Automotive Electronics 3+0+0
ET4054	Lab: Automotive Electronics 0+0+1
ET4055	Optical Fiber Communication 3+0+0
ET4056	Lab: Optical Fiber Communication 0+0+1
ET4057	Microwave Engineering 3+0+0
ET4058	Lab: Microwave Engineering 0+0+1
ET4059	Network & Security 3+0+0
ET4060	Lab: Network & Security 0+0+1
ET4061	Analog IC design 3+0+0
ET4062	Lab: Analog IC design 0+0+1
ET4063	Digital VLSI 3+0+0
ET4064	Lab: Digital VLSI 0+0+1
ET4065	Digital Image Processing 3+0+0
ET4066	Lab: Image Processing 0+0+1
ET4067	Speech & Audio Processing 3+0+0
ET4068	Lab: Speech & Audio Processing 0+0+1
ET4069	Cloud Computing 3+0+0
ET4070	Lab: Cloud Computing 0+0+1
ET4071	Digital Forensic 3+0+0
ET4072	Lab: Digital Forensic 0+0+1
ET4073	Radar & Satellite Communication 3+0+0
ET4074	Lab: Radar & Satellite Communication 0+0+1

ET4075	Real Time Operating Systems 3+0+0
ET4076	Lab: Real Time Operating Systems 0+0+1
ET4077	Android Development and Programming 3+0+0
ET4078	Lab: Android Development and Programming0+0+1
ET4079	Power Electronics 3+0+0
ET4080	Lab: Power Electronics 0+0+1

ET4079: Power Electronics (Professional Elective)	
Teaching Scheme **Lectures: 3Hrs/Week** **Total credits: 03**	**Examination Scheme** **Test I: 15 Marks** **Test II: 15 Marks** **Teachers Assessment: 10 Marks** **End Semester Exam: 60 Marks**

Prerequisites: Knowledge of Circuit Analysis, fundamental electronics circuits, differential equations and Calculus

Course description: Power electronics deals with the application of solid-state electronics for the control and conversion of electric power. The course is an introduction to power converters and its application. It provides a basic knowledge of circuitry for the control and conversion of electrical power with high efficiency. These converters can change and regulate the voltage, current, or power

Course Objectives:

To enable students to gain knowledge and understanding in the following aspects:

- To enhance knowledge and understanding of power electronic devices and their application in power electronic converters and selection of components for different applications
- The concepts and operating principles of power electronics circuits.
- Design procedures and techniques of power electronics systems & Design of power electronics circuits such as DC/DC, AC/DC, DC/AC and AC/AC converters
- To enhance the knowledge and understanding of power electronic converters and their application in power electronic systems
- To provide students with the skills and techniques necessary to analyze and synthesize power electronic circuits utilizing modern power electronic devices.

Course Outcomes: After completing the course, students will able to:

CO1	Understand the power semiconductor devices.	K1
CO2	Describe basic operation and compare performance of various semiconductor devices, passive components and switching circuits	K2
CO3	Solve the numerical problems on semiconductor switches, rectifier, converter, inverter, choppers circuits.	K2
C04	Describe inverters and choppers	K2
CO5	Understand the applications in power electronics.	K2
CO6	Apply knowledge of power electronics to build and troubleshoot power electronics circuits	K3

Detailed Syllabus:

Unit-I	**Power Semiconductor Devices**: Power diodes, power transistors, power MOSFET, IGBT, SCR, GTO,TRIAC,DIAC, UJT, PUT- construction, steady state and switching characteristics, performance parameters, SCR protection circuits.

Unit-II	**Triggering and Commutation of SCR**: R and RC triggering, UJT triggering circuits, different commutation techniques – circuits and principles of operation.
Unit-III	**Phase Controlled Rectifiers**: Phase angle control, phase-controlled rectifiers, single phase/ three phase, half control, single phase full wave converter,three pulse, six pulse three phase converters,Introduction to cycloconverter.
Unit-IV	**Chopper:** Basic chopper classification, basic chopper operation, control strategies, chopper configuration, thyristor chopper circuit, Source filter.
Unit-V	**Inverter:** Classification of inverter, Series, parallel, bridge, three phase inverter, sinusoidal PWM- introduction to space vector modulation -Current source Inverter. Power electronics applications: Industrial drives chopper-controlled drives, Induction heating, UPS and SMPS.

Text and Reference Books

1. P.C. Sen, "PowerElectronics", Tata McGraw Hill
2. M.H. Rashid,"PowerElectronics", John Wiley & Sons
3. General Electric, "SCRmanual"
4. G. K. Dubey, S. R Doradle, "Thyristors Power Controller"
5. J. M. Jalnekar and N. B. Pasalkar, "PowerElectronics" Technical Publication
6. M D Singh and K. B Khanchandani, "PowerElectronics", Tata McGraw Hill
7. B.K.Bose, "Power Electronics & A.C. Drives", Prentice Hall, 1986.

Mapping of Course outcome with Program Outcomes

Course Outcome	PO 1	PO 2	PO3	PO4	PO 5	PO 6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	1	-	-	-	-	-	-	-	1	1	-	2	1	-
CO2	2	2	-	-	-	-	-	-	-	1	1	-	2	1	-
CO3	2	2	-	-	-	-	-	-	-	1	1	-	2	-	-
CO4	2	2	-	-	-	-	-	-	-	1	1	-	2	1	-
CO5	2	1	-	-	-	-	-	-	-	1	1	-	2	1	-
CO6	3	2	1	-	-	-	-	-	-	2	1	-	2	1	-

3 – High 2 – Medium 1 - Low

Teacher's Assessment: Teachers Assessment of 10 marks is based on one of the / or combination of few of following

1) Simulation
2) Power point presentation of case studies
3) Question & answer / Numerical solution
4) Study of Industry processes and its presentation

ET4080: Lab Power Electronics	
Teaching Scheme **Practical: 2Hrs/Week** **Total credits :01**	**Examination Scheme** **Term Work: 25 Marks**

Laboratory Course Outcomes

CO1	Understand the principles of operation, simulation and design procedures of ac-dc , dc-dc converter, dc-ac inverters
CO2	Understand the principles of operation, simulation and characteristic of power devices, method of turn on and turn off of SCR
CO3	Implement set up and test power electronic circuits in the laboratory
CO4	Use Simulation tools.

List of Experiments

Sr. No.	Details
1	Plot the V/I characteristics of power devices.
2	Implement Firing circuit of SCR and design of Snubber circuit.
3	Perform the commutating circuits of SCR.
4	Plot the TRIAC and DIAC characteristics.
5	Perform Single phase/Three phase, thyristor –bridge converter with R/RL load
6	To study Series inverter.
7	To study Performance of parallel inverter using two thyristors.
8	Implement SCR application (Any one).
9	Implement the performance of chopper circuit using SCR (DC chopper).
10	To Study of cyclo-converter circuit using thyristors.

Relationship of course learning outcomes to ECE program outcomes:

Mapping of Course outcome with Program Outcomes

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	-	-	2	-	-	-	-	-	-	-	-	2	-	-
CO2	2	-	-	2	-	-	-	-	-	-	-	-	2	-	-
CO3	2	-	-	2	-	-	-	-	-	-	-	-	2	-	-
CO4	2	-	-	2	2	-	-	-	-	-	-	-	2	-	-

3 – High 2 – Medium 1 - Low