6th Semester

Course No.	Subject	Teaching Periods		Credits
		L	T	
PCCECE61	**Communication Systems – II**	3	1	4

Section	Course contents	Hours
1.	Waveguides and Cavity Resonators, Transverse Electric and Transverse magnetic Waves	3
2.	Wave propagation through rectangular and circular waveguides, Power transmission and attenuation in waveguides	4
3.	Electromagnetic Resonators, Rectangular & Circular cavities	4
4.	Strip Lines: Propagation Constant, Characteristic impedance and attenuation characteristics of strip lines and micro-strips	4
5.	Propagation of Waves: Waves in free space, Attenuation, Absorption and polarization, effects of Environment	5
6.	Ground wave propagation, sky wave propagation, space wave propagation	5
7.	Troposcatter propagation a n d Extra-terrestrial propagation	3
8.	Radiation: Retarded Potential and Electromagnetic field, Radiation from a short current element	3
9.	Half wave dipole, Radiation Resistance, Effect of ground on radiating elements	3
10.	Antennas: Basic Antenna parameters, Radiation pattern, Directivity and Antenna Gain	3
11.	Bandwidth and beam-width, Polarization	3
12.	Folded dipole and applications. Antenna arrays	3
13.	Parabolic reflector, Properties and feed mechanism	2
14.	Horn Antenna, Loop Antenna	1
15.	Satellite Communication	4
TOTAL HOURS FOR THE COURSE		**50**

References

1. Liao, S. Y: Microwave Devices & Circuits, PHI
2. David Pozar: Microwave Engineering, John Wiley
3. Jordan, E and Balman, K: Electromagnetic Waves & Radiating Systems, PHI
4. Krauss, J.D: Antennas, Mc Graw Hill.

Course No.	Subject	Teaching Periods		Credits
		L	T	
PCCECE62	**Microcontrollers and Embedded Systems**	2	1	3

Section	Course contents	Hours
1.	Introduction to embedded systems, Embedded System applications, Overview of Microcontrollers, choosing a Microcontroller for an embedded application	4
2.	8051 Microcontroller hardware, internal Architecture, input/output pin and port architecture	4
3.	Instruction Set of 8051, Data transfer instructions, Arithmetic instructions, Logical instructions, Branch instructions, Subroutine instructions, Bit manipulation instruction	4
4.	Addressing modes, accessing memory using various addressing modes with assembly code examples	2
5.	Single bit instructions and programming, I/O port programming: I/O programming, bit manipulation	3
6.	8051 programming in C, 8051 Hardware Connection and Hex File	4
7.	Timer and counter architecture in 8051, programming 8051 timers, counter programming, Examples of Timers and Counters using Assembly and C programming Language	4
10.	Interfacing LCD with 8051 using C programming Language	4
11.	Interfacing Keyboard using C programming Language	4
12.	Interfacing A/D & D/A converters with programming examples	4
13.	Interfacing 8051 with DC Motor, Relay, Stepper-motor, and Servomotor	8
14.	Intel Programmable peripheral interface (PPI)-8255, 8255 interfacing with 8051	2
TOTAL HOURS FOR THE COURSE		**50**

References

1. The 8051 Microcontrollers and Embedded Systems: Muhammed Ali Mazidi; Pubisher: Pearson Publication
2. The 8051Microcontrollers Architecture, Programming & Applications Kenneth J.AyalaPenram International Publishing
3. 8051 Microcontroller: Internals, Instructions, Programming and Interfacing: Subrata Ghoshal Publisher: Cengage Learning Asia
4. Embedded Systems & Robots : Projects Using the 8051 Microcontroller: Subrata Ghoshal Publisher: Cengage Learning Asia.

Course No.	Subject	Teaching Periods		Credits
		L	T	
PCCECE63	Electrical Machines	2	1	3

Section	Course contents	Hours
1.	Transformers: Operating principle, classification, construction, emf equation, phasor diagrams, equivalent circuit model, losses & efficiency, voltage regulation, frequency response, polarity test	6
2.	Autotransformers, three- phase transformer connections, impedance matching	4
3.	Isolation & instrument transformers	3
4.	D.C. Machines: Operating principle, generator & motor action, construction, types of excitation, emf & torque equations, power stages & efficiency. Commutation & Armature Reaction	6
5.	Characteristics & application of d.c generators, starting & speed control of d.c motors	4
6.	Characteristics & applications of d.c motors	3
7.	Electric braking	1
8.	Induction Machines: Three-phase induction motors. Principle of operation, construction, types	3
9.	Rotating magnetic field, emf equation of an AC Machine, torque developed in an induction motor, equivalent circuit model, torque-speed characteristics, starting & speed control	6
10.	Single phase induction motors, starting, application	3
11.	Synchronous Machines: Construction, types & operating principle of synchronous generator, A.C armature windings, equivalent circuit, phasor diagrams, voltage regulation, parallel operation, synchronization, Power Angle characteristics, effect of field excitation change	6
12.	Synchronous Motor, principle, starting, hunting, damper windings	3
13.	Special Purpose Motors: Stepper Motor, Universal Motor, Shaded-pole Motor	4
TOTAL HOURS FOR THE COURSE		**52**

References

1. Electric Machinery by Fitzgerald
2. Electric Machinery by Nagrath

Course No.	Subject	Teaching Periods		Credits
		L	T	
PCCECE64	**Electronic Measurement & Instrumentation**	2	1	3

Section	Cour	Hours
1	Measurement System and Standards: Instrumentation system and its classification, Primary and secondary standards, Standards of various	6
2	Static and Dynamic response	2
3	Measurement Errors, and accuracy of an instrumentation system	3
4	Signal Generators and Analyzers: Function generators, RF Signal Generator, Sweep Generator, Frequency synthesizer, Wave Analyzers for Audio and radio frequency waves. Measurement of harmonic distortion. Spectrum analysis	4
5	**Mechanical and Electromechanical sensor** • Resistive (potentiometric type) • Strain gauge • Inductive sensor • LVDT • Proximity sensor	4
6	**Capacitive sensors:** Piezoelectric element force & stress sensing, ultrasonic sensors	4
7	**Thermal sensors:** Resistance change type (RTD, Thermistor), Thermocouple, Radiation sensors (Pyrometer)	4
8	**Optical sensors:** LDR, Photovoltaic cells, Photodiodes	3
9	Introduction to Smart Sensors	3
10	Definition, advantages and Importance of PLC, Evolution history of PLC, architecture and block diagram	5
11	PLC hardware Types of PLC, CPU unit architecture, Memory classification, Input/output devices and it's interfacing, Digital-Analog modules, Communication modules, Special function modules	12
TOTAL HOURS FOR THE COURSE		**5**

References

1. Electronic Measurements by W. Cooper
2. Electrical & Electronic Measurements by A.K. Sawhney

Course No.	Subject	Teaching Periods		Credits
		L	T	
PCCECE65	**VLSI Design**	2	1	3

Section	Course contents	Hours
1	Review of MOSFET: Constructional & Operational features of MOSFET	3
2	I-V Equation, Second Order Effects	3
3	MOS Capacitor, C-V Characteristics	2
4	MOSFET Switch, Transmission gate	2
5	CMOS Inverter (Pull-up & Pull-down), Inverter Static Characteristics, Noise Margin	3
6	Switching characteristics of Inverter (Fall Time, Rise Time, Delay Time), Dynamic Characteristics, Power Dissipation	3
7	VLSI Technology: Wafer Processing, Oxidation, Epitaxy, Deposition, Ion- Implantation & Diffusion	4
8	The Silicon gate Process, n-well CMOS Process, p-well Process, Twin-Tub Process, Silicon On Insulator	4
9	CMOS Logic Design (Gates): CMOS Logic Gate Design (NAND & NOR Logic)	3
10	Switching Characteristics (Delay Time, Power, Fan-in, Fan-out), Transistor Sizing, The Compound Gates	4
11	CMOS Logic Structures: CMOS Logic, Pseudo-nMOS Logic, Dynamic CMOS Logic, C2MOS Logic, BiCMOS Logic, NP Domino Logic	5
12	Layout: Design Rules/Floor planning, Simple Layout Examples	5
13	CMOS Logic Design (Circuits): Multiplexers, MUX Implementation in CMOS & Transmission Gate	4
14	RAM Cell Implementation, Implementation of Flip-Flop, Register/Counters	5
TOTAL HOURS FOR THE COURSE		**50**

References

1. CMOS VLSI Design: A Systems Perspective by N. Weste & K. Eshraghian
2. CMOS VLSI Design: A Circuits & Systems Perspective by N. Weste, D. Harris & A. Bannerjee
3. Digital Integrated Circuits: A Design Perspective by Rabaey

Course No.	Subject	Teaching Periods	Credits
		P	
PCCECE61L	**Communication Systems Lab – II**	2	1

List of Experiments

1. To measure and plot radiation pattern of different antennas yagi-uda, parabolic, path, horn, dipole and mono pole antenna.
2. To study and verify the communication using wave-guides.
3. To study and verify VSWR for a traveling wave.
2. To study Satellite Communication using trainer kit.

Course No.	Subject	Teaching Periods	Credits
		P	
PCCECE62L	**Microcontrollers and Embedded Systems Lab**	2	1

List of Experiments

1. Interface 8051 microcontroller with 8 LEDS and write a program to flash these LEDs.
2. Interface 8051 microcontroller with Eight Keys and write a program that will scan these Eight Keys and Display its Binary code on LEDs.
3. Interface 8051 microcontroller with an LCD and write a program to display a message on the first and 2nd line of LCD.
4. Interface 8051 microcontroller with a seven-segment display and display a message "1234" on the seven-segment display.
5. Write a program for energizing the Two DIP relays interfaced to 8051 microcontroller board.
6. Write a program to demonstrate Opto-isolated inputs on 8051 board.
7. Interface 8051 microcontroller with a stepper motor and write a program to move the motor first clockwise by 20 steps and then anticlockwise by 20 steps and test on the board.
8. Interface 8051 microcontroller with ADC chip and the display digital value on an LCD.
9. Write a program to demonstrate DAC by generating a RAMP signal.
10. Write a program to store data in the EEPROM (24C02) provided on the 8051 board for permanent storage of data.
11. Write a program to read data from the EEPROM (24C02) provided on the 8051 board for permanent storage of data.

Note: Programs for above experiments should be implemented both using Assembly and C programs instructions.

Course No.	Subject	Teaching Periods	Credits
		P	
PCCECE64L	**Electronic Measurement & Instrumentation Lab**	2	1

List of Experiments

1. Obtain Characteristics of LVDT
2. Obtain Characteristics of Strain gauge
3. Obtain Characteristics of thermocouple
4. Obtain Characteristics of thermistor
5. Obtain Characteristics of RTD transducer
6. PLC programs based on the available kits in the Lab

Course No.	Subject	Teaching Periods	Credits
		P	
PCCECE65L	**VLSI Design Lab**	2	1

List of Experiments

1. To find VI characteristics of a MOSFET.
2. To verify the operation of MOSFET as a Switch.
3. To verify the operation of MOSFET as a linear resistor.
4. To verify the Voltage transfer characteristics of CMOS Inverter.
5. To design and verify the operation of CMOS based basic(NOT,AND,OR) and universal gates(NAND, NOR).
6. To design and verify 2x1 multiplexer/ de-multiplexer using CMOS Logic.
7. To design and verify 2x1 multiplexer/ de-multiplexer using transmission gates.
8. To design and verify RAM Cell using CMOS cross coupled inverters.
9. To design/generate layout of CMOS based NOT, NAND and NOR gates.

Note: Simulators used may include ADS, Cadence, Mentor Graphics based on availability.

Course No.	Subject	Teaching Periods	Credits
		P	
PSIECE66	**SEMINAR**	2	1

DESCRIPTION:

The Technical Seminar shall be carried out as part of the 6th semester curriculum and is important for the partial fulfillment for the award of the Bachelors Degree in Engineering. The main objectives of conducting the seminar are:

1. To encourage the students to study advanced engineering developments
2. To prepare and present technical reports.
3. To encourage the students to use various teaching aids such as over head projectors, power point presentation and demonstrative models.

METHOD OF EVALUATION:

During the seminar session each student is expected to prepare and present a topic on engineering/ technology, for a duration of about 15 to 20 minutes in front of the faculty committee for seminars and the students from the 6th semester (preferably from other semesters also). Each student is expected to present at least twice during the semester and the student is evaluated based on that. At the end of the semester, he / she can submit a report on his / her topic of seminar and marks are given based on the report. A Faculty guide is to be allotted and he / she will guide and monitor the progress of the student and maintain attendance also. Evaluation is 100% internal.