SYLLABUS

For

B.TECH. PROGRAMME

In

ELECTRONICS & COMMUNICATION ENGINEERING

INSTITUTE OF TECHNOLOGY

UNIVERSITY OF KASHMIR

ZAKURA CAMPUS

SRINAGAR, J&K, 190006

6th Semester

Course No	*Subject*	*Teaching Periods*			Credits
		Lect	*Tut*	*Prac*	
ECE6117B	**Communication Systems - II**	**3**	**1**	**0**	**4**
ECE6217B	**Microcontrollers and Embedded Systems**	**3**	**1**	**0**	**4**
ECE6317B	**Computer Organization and Architecture**	**3**	**1**	**0**	**4**
ECE6417B	**Electronic Measurement & Instrumentation**	**3**	**2**	**0**	**5**
ECE6517B	**Power Electronics**	**3**	**1**	**0**	**4**
ECE6217BL	**Microcontrollers and Embedded Systems Lab**	**0**	**0**	**2**	**1**
ECE6517BL	**Power Electronics Lab**	**0**	**0**	**2**	**1**
ECE6617BL	**Electronic Measurement & Instrumentation / Communication Systems –II Lab**	**0**	**0**	**4**	**2**
	Total	**15**	**6**	**8**	**25**

Course No	Subject	Teaching Periods		Credits
		Lect	Tut	
ECE6117B	**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 microstrips.	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 and 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
		Lect	Tut	
ECE6217B	**Microcontrollers and Embedded Systems**	3	1	4

Section	Course contents	hours
1.	Introduction to embedded systems, components of an embedded system, types of embedded system, levels of embedded system,	3
2.	Embedded System applications, Embedded system design considerations, Embedded Processors: Microprocessors, Microcontrollers, DSP and ASICs, ASSP, MP ,FPGA, SoC	4
3.	Comparative Assessment of Embedded Processors. Embedded memory devices and Embedded I/O.	3
4.	Embedded high and low level programming.	2
5.	Microcontrollers for embedded systems, classes of microcontrollers, types of microcontrollers,	3
6.	Introduction to microcontroller platforms: ARM, ATMEL/ AVR, PIC, ARDUINO, Raspberry and 8051.	2
7.	Choosing a Microcontroller for an embedded application.	1
8.	8051 Microcontroller hardware, internal Architecture, input/output pin and port architecture, Bare minimum system with external circuits, other members of 8051.	4
9.	Addressing modes ,accessing memory using various addressing modes	3
10.	Jump, Loop and call instructions, time delay generation and calculation,	3
11.	Single bit instructions and programming, I/O port programming: I/O programming, bit manipulation.	2
12.	Timer and counter architecture in 8051,programming 8051 timers, counter programming, pulse frequency and pulse width measurements.	4
13.	Serial communication in 8051: Basics of serial communication, 8051 connection to RS232, 8051 serial communication programming.	3
14.	Interrupts programming: Interrupts of 8051,programming timer interrupts, programming external hardware interrupts, and programming serial communication interrupts.	4
15.	Interfacing memory (EEPROM) with 8051,	2
16.	Programmable peripheral interface(PPI)-8255,programming 8255, 8255 interfacing with 8051.	2
17.	Interfacing Key board. Interfacing LED/ LCD,	2
18.	Interfacing A/D & D/A converters,	1
19.	Interfacing DC motor, Relay, solenoid, stepper-motor, servomotor.	2
TOTAL HOURS FOR THE COURSE		**50**

References

1. The 8051 Microcontrollers and Embedded Systems: Muhammed Ali Mazidi
2. The 8051 Microcontrollers Architecture, Programming & Applications Kenneth J. Ayala
3. Design with PIC Microcontroller: John Petman
4. Embedded systems by Raj Kamal

Course No.	Subject	Teaching Periods		Credits
		Lect	Tut	
ECE6317B	**Computer Organization and Architecture**	3	1	4

Section	Course contents	Hours
1.	Review of Number Systems,	2
2.	Computer Level Hierarchy	2
3.	Evolution of Computers, Von-Neuman Architecture, Structure and Components of Computers,	3
4.	Computer Functions, Instruction Execution and Instruction Cycle State Diagrams, Computer Buses	3
5.	Bus Interconnection and Hierarchy	2
6.	Elements of Bus Design	1
7.	Bus Arbitration and Timings	3
8.	Introduction to High speed buses. Basic CPU equation. Measuring Performance – MIPS, FLOPS, CPI/IPC, Benchmark, Geometric and Arithmetic Mean, Speedup, Amdahl's and Moore's Laws.	4
9.	Instructions and Instruction Set–Characteristics, Types, Functions, Execution, Representation, Format, Addressing Modes,	3
10.	CPU Registers – Organization, Programmer Visible, Status/Control, Accumulator, and general purpose registers, Stack based CPU,	3
11.	Computer arithmetic logic design, fast adders, multiplication, Booth's algorithm, fast multiplication, integer division, floating poi n t arithmetic.	3
12.	ALU– Fixed and Floating point ALU Organization. Control Unit – Functional Requirements, Structure, Control Signals, hardwire and Micro-programmed Wilkes Control unit, Micro-instructions and its formats, Control Memory	4
13.	Introduction to Pipelining and Parallel Processing.	2
14.	Memory Hierarchy, types and Characteristics, Primary Memory- Types, Working, Chip Organization, Expansion,	3
15.	Cache Memory- Mapping Schemes, Replacement Policies, Hit and Miss,	3
16.	Write policies, Coherence. Computer Storage–Magnetic and Optical Storage Organization and Format, Virtual memory– Overlays, Paging, Segmentation and Fragmentation	3
17.	Introduction to RAID, and CAM. **Parallel processing:** Introduction to parallel processing and architecture- classification, array processors, pipeline architectures, vector processors,	3
18.	GPU's, interconnection networks, multistage networks, message passing architecture.	3
TOTAL HOURS FOR THE COURSE		**50**

References

1. Computer Organization & Architecture by M. M. Mao
2. Computer organization by Hamachar

Course No.	Subject	Teaching Periods		Credits
		Lect	Tut	
ECE6417B	**Electronic Measurement & Instrumentation**	3	2	5

Section	Topic	Hours
1	Measurement System and Standards: Instrumentation System and its classification, Primary and secondary standards, Standards of various electrical quantities	6
2	IEEE standards, Static and Dynamic response	2
3	Errors, and accuracy of an instrumentation system	3
4	Measurement of Basic Parameters: Galvanometer and its principle, Moving Coil, Moving iron meters	4
5	true rms meter, Bridge measurements	4
6	Q meters, Measurement of Voltage, Current, Power, Energy	4
7	Measurement of Resistance, Capacitance, Inductance	3
8	Transducers, Sensors, and Actuators: Active and Passive, Transducers types: Resistive, Inductive, capacitive, Piezoelectric, Optical, Photo diodes; Measurement of Physical, Physiological, Chemical quantities	6
9	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.	7
10	Digital Instrumentation: Comparison of analog and digital techniques, Digital voltmeter, Digital multimeter, Frequency counter, Measurement of frequency and time interval, extension of frequency range, Measurement errors.	7
11	Data Acquisition System: Components of data acquisition system, Interfacing of transducers.	4
Total Hours		50

References:

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

Course No.	Subject	Teaching Periods		Credits
		Lect	Tut	
ECE6517B	**Power Electronics**	3	1	4

Section	Course contents	hours
1.	Review of power semiconductor switching devices, Diode, Thyristors, MOSFET, IGBT, characteristics and applications	7
2.	Introduction to Turn-ON/Turn-OFF mechanism of switching devices, Gate-drive circuits, Switching-aid circuits,protection, Heat sink design	7
3.	Single phase rectifiers (uncontrolled, semicontrolled, controlled) with passive loads, performance analysis, Applications	8
4.	Three-phase rectifiers (uncontrolled, semicontrolled, controlled) with passive loads, performance analysis, Applications	7
5.	Single-phase inverter : principle of operation, single phase bridge inverter, voltage control in inverters and harmonic reduction using PWM strategies, Applications	8
6.	Three-phase inverters: 180 degree conduction and 120 degree conduction, voltage control in inverters and harmonic reduction using PWM strategies	8
7.	Introduction to DC-DC converters; buck, boost and buck-boost converters, Applications	5
TOTAL HOURS FOR THE COURSE		**50**

References

1. Fundamental of Power Electronics: Robert Erickson, D. Maksimovic
2. Power Electronics, Circuits, Devices and Applications: Muhammad H. Rashid
3. Power Electronic, Devices, Applications, and Passive Components: Barry W. Williams
4. Power Electronics - converters, Applications, and Design: Ned Mohan, Tore. M. Undeland, William P. Robbins

Course No.	Subject	Teaching Periods	Credits
		P	
ECE6217BL	**Microcontrollers and Embedded Systems Lab**	2	1

List of Experiments

1. Generate a specified time delay using Embedded 'C'.
2. Interface an ADC and a temperature sensor to measure temperature
3. Interface a DAC & Generate a stair case wave form – with step duration and no. of steps as variables
4. Flash a LED connected at a specified output port terminal
5. Interface a stepper motor – and rotate it clock wise or anti clock wise through given angle steps
6. Using Keil software, write a program to pick the smallest among a given set of numbers
7. Using Keil software, write a program to pick the largest among a given set of numbers
8. Using Keil software, write a program to arrange a given set of numbers in ascending order
9. Using Keil software, write a program to arrange a given set of numbers in descending order
10. Using Keil software, write a program to generate a rectangular wave form at a specified port terminal

Course No.	Subject	Teaching Periods	Credits
		P	
ECE6517BL	**Power Electronics Lab**	2	1

List of Experiments

1: To do the following:

(a) To obtain V-I Characteristics of an SCR.

(b) To obtain V-I Characteristics of a Triac.

2: To obtain the Static Emitter Characteristics of a UJT.
3: To study the Line-synchronized UJT Relaxation Oscillator as a triggering agent for a thyristor and plot load voltage Vs. firing angle.
4: To study various firing schemes of an SCR and draw the traces for various waveforms: (a) Resistance Triggering Technique,
(b) R-C Triggering Technique,
(c) Linear Firing Scheme,
(d) Inverse Cosine Firing Scheme.
5: To study a Single-Phase Half-Wave Converter and plot Source voltage, Load voltage and load current for R and R-L loads.
6: To study a Single-Phase Semi-Converter and plot Source voltage, Source current, Load voltage and load current for R, R-L and Motor Loads.
7: To study a Single-Phase Full-Converter and plot Source voltage, Source current, Load voltage and load current for R, R-L and Motor Loads.
8: To study a Three-Phase Semi-Converter and plot Source voltage, Source current, Load voltage and load current for R, R-L and Motor Loads.
9: To study a Three-Phase Full-Converter and plot Source voltage, Source current, Load voltage and load current for R, R-L and Motor Loads.
10: To study a Single-Phase Dual Converter on Motor Load.
11: To study a DC-DC Buck Converter (Step Down Chopper) for R, R-L and DC Motor Load and plot Load voltage Vs. Duty Ratio.
12: To study a Single-Phase Voltage Source Inverter on R and R-L Loads.
13: To study a Three-Phase Voltage Source Inverter on R and R-L Loads.
14: To study a Single-Phase PWM Voltage Source Inverter on R and R-L Loads and plot Load voltage Vs. Modulation index.

Course No.	Subject	Teaching Periods	Credits
		P	
ECE6617BL	**Electronic Measurement & Instrumentation / Communication Systems – II Lab**	4	2

List of Experiments

Electronic Measurement & Instrumentation Experiments

1. Find Q of an LC Circuit.
2. To study use of 741 as an instrumentation Amplifier.
3. Study of ADC 0801.
4. Study of DAC 0808.
5. Experiments on study and use of transducers for common electrical and non-electrical quantities.
6. Experiments on wave form analysis for audio and radio range of signals.
7. Study of intelligent instruments and measurement systems.
8. Study of various Trainer Kits pertaining to the subject.

Communication Systems-II Experiments

1. To measure and plot radiation patterns of different antennas.
2. To study Satellite Communication using trainer kit.