SYLLABUS

For

B.TECH. PROGRAMME

In

ELECTRONICS & COMMUNICATION ENGINEERING

INSTITUTE OF TECHNOLOGY

UNIVERSITY OF KASHMIR

ZAKURA CAMPUS

SRINAGAR, J&K, 190006

4th Semester

Course No	*Subject*	*Teaching Periods*			*Credits*
		Lect	*Tut*	*Prac*	
MTH4117B	**Engineering Mathematics – IV**	3	1	0	4
ECE4217B	**Analog Electronic Circuits-II**	3	2	0	5
ECE4317B	**Communication Systems- I**	3	1	0	4
ECE4417B	**Electromagnetic Fields and Waves**	3	1	0	4
ECE4517B	**Digital Electronics and Logic Design**	3	1	0	4
ECE4217BL	**Analog Electronics Circuits- II Lab**	0	0	2	1
ECE4517BL	**Digital Electronics and Logic Design Lab**	0	0	2	1
ECE4617BL	**Communication Systems-I / EMF Lab**	0	0	4	2
Total		15	6	8	25

Course No	Subject	Teaching Periods		Credits
		Lect	Tut	
MTH4117B	**Engineering Mathematics – IV**	3	1	4

Section	Course contents	hours
1.	Analytical Functions, C-R Equations	4
2.	Complex Integration	3
3.	Cauchy's Fundamental Theorem, Cauchy's Integral Theorem	3
4.	Cauchy's Inequality and Liouville's theorem on Integral Function	2
5.	Taylor's and Laurent's Expansions	3
6.	Zeroes and Poles of Analytic Functions	2
7.	Residues and Contour Integration	3
8.	Solution of Series	2
9.	Legendre's Functions, Rodrigues's Formula	3
10.	Generating Functions for Legendre's Polynomials and Recurrence Formulae	3
11.	Bessel's Functions	3
12.	Recurrence Formulae and Bessel's Functions of Integral Order.	3
13.	Continuous Wavelet Transform, Basic Properties of Wavelet Transform	3
14.	Discrete Wavelet Transform, Orthonormal Wavelets	3
15.	Multi Resolution Analysis	2
16.	Construction of Orthonormal Wavelets	2
17.	Daubchie's Wavelets and Algorithms	3
18.	Band limited wavelets, Balian low theorem	3
TOTAL HOURS FOR THE COURSE		**50**

References:

1. Complex Variables & Applications by R. V. Churchill
2. Theory of Functions of Complex Variables by E. I. Copson

Course No.	Subject	Teaching Periods		Credits
		Lect	Tut	
ECE4217B	**Analog Electronic Circuits-II**	3	2	5

Section	Course contents	Hours
1.	Block diagram representation of a typical op-amp, Analysis op-amp ICC circuits, types, designations, packages,	3
2.	Pin configurations and power supplies. Ideal op-amp, equivalent circuit, open loop op amp configurations of differential, inverting and non-inverting amplifiers,	2
3.	Op amp feedback amplifier analysis, differential amplifier with one, two and three op amps.	3
4.	Op amp parameters - offset voltages and currents, bias current, drift, PSRR, CMRR, SNR, offset nulling methods	3
5.	AC performance of Op amp: Bandwidth, slew rate and frequency response.	3
6.	DC and AC amplifiers, peaking, summing scaling and averaging	2
7.	amplifiers, instrumentation amplifier, differential input and differential,	
8.	V to I and I to V converters, integrator,	3
9.	Differentiator comparator, non-linear amplifier.	2
10.	Sinusoidal oscillators: Basic Operations, analysis, Barkhausen's Criteria, Various types of oscillator circuits and their analysis, Design of Practical Oscillator Circuits.	3
11.	OPAMP based design of Phase shift oscillator, Wien bridge oscillator, square, triangular and sawtooth wave generator,	5
12.	voltage controlled oscillator, zero crossing detector, window detector.	3
13.	Non-linear IC applications using OPAMP: OPAMP Comparator, Schimtt Trigger, Sample and Hold Circuit, Active Filters,	3
14.	Effect of slew rate on waveform generation- monostable circuits- Principles of VCO circuits. Comparator Circuits: Zero Crossing Detector- Regenerative comparator circuits.	3
15.	Multivibrators and Wave Form Generators: Bistable multivibrators, Bistable circuit as a memory element, Generation of Square & Triangular waves using Astable multivibrator,	3
16.	Generation of the standard Pulse-The Monostable multivibrator, Integrated circuit Timers,	3
17.	Implementation of Astable, Monostable and Bistable multivibrators using 555 Timer, Various practical applications of 555 Timer.	2
18.	Power Amplifiers and Power Supplies: Classification of power amplifiers, Class A, Class B, Class AB and Class C power amplifiers;	2
19.	Analysis and design. Power supplies and IC regulators.	2
TOTAL HOURS FOR THE COURSE		**50**

Books Recommended

1. Operational Amplifiers by Ramakant Gaekwad
2. Integrated Electronics by J. Millman & C. Halkias
3. Microelectronics by Sedra & Smith
4. Electronic Circuits by D. Schelling & Belove.
5. Electronic Devices & Circuits by R. Boylestad

Course No.	Subject	Teaching Periods		Credits
		Lect	Tut	
ECE4317B	**Communication Systems-I**	3	1	4

Section	Course contents	Hours
1.	Introduction to Analog modulation, AM, DSB/SC, SSB, VSB,	3
2.	AM, DSB/SC, SSB, VSB, detailed explanation, waveforms, and mathematical expressions	5
3.	Angle modulation, NBFM, WBFM	3
4.	Diode detector, Frequency discriminator,	2
5.	AM & FM, Transmitter	2
6.	Demodulation: AM and FM	3
7.	Signals Radio Receivers – AM & FM (Block diagram).	2
8.	Introduction to digital communication techniques	2
9.	ASK,FSK,PSK,DPSK,DEPSK,QPSK, M-ary PSK, ASK, FSK	5
10.	similarity of BFSK and BPSK	1
11.	Baseband signal receiver	2
12.	probability of error, probability of error using matched filter,	3
13.	the optimum filter, matched filter	2
14.	coherent reception, non-coherent detection of FSK,	2
15.	calculation of error probability of ASK,BPSK,BFSK,QPSK	4
16.	Introduction to Noise Analysis ,types of noise	2
17.	Performance of AM & FM Systems, in presence of noise	3
18.	Threshold in AM & FM, Demodulation,	2
19.	Pre-emphasis and De-emphasis in FM Systems	2
TOTAL HOURS FOR THE COURSE		**50**

Books Recommended

1. Principles of Communication Systems by Taub & Schelling.
2. Electronic Communication Systems by G. Kennedy.
3. Communication systems by S. Haykins.

Course No.	Subject	Teaching Periods		Credits
		Lect	Tut	
ECE4417B	**Electromagnetic Fields and Waves**	3	1	4

Section	Course contents	Hours
1.	Review of Electric Field Coulombs law, Electric field due to a point charge,surface charge and volume charge, divergence and curl of E, Electric potential	4
2.	Review of Magnetic Field, Lorentz law, Biot Savarts law, B due to line current, Surface current and volume current densities, Divergence and curl of B, Magnetic Potential	4
3.	Maxwell's Equations,Maxwells =ns in Electrostatics and magnetostatics, in medium, final Maxwells =ns	2
4.	Potential functions, Boundary conditions	2
5.	Wave equation and its solution	2
6.	Electromagnetic Waves, Poynting Theorem,	3
7.	Phase and group velocity,	2
8.	Plane waves in lossless and lossy media,	3
9.	Wave propagation in Ferrites-Faraday Rotation and Birefrigerence.	3
10.	Normal and oblique incidence at plane conducting boundary	2
11.	Normal and oblique incidence at plane dielectric boundary	2
12.	Transmission Lines Transmission Line equations and solutions,	3
13.	Characteristic impedance and propagation constant	3
14.	Reflection and transmission coefficients, SWR	3
15.	Open and short circuit lines- their use as circuit elements at UHF	4
16.	Line impedance and admittance	3
17.	Smith Chart	2
18.	Impedance Matching	3
TOTAL HOURS FOR THE COURSE		**50**

References

1. Jordan E and Balman K: Electromagnetic Waves & Radiating Systems, PHI
2. David K. Cheng: Field and Wave Electromagnetics, Addison Wesley
3. Krauss: Electromagnetics ,Mc Graw Hill.
4. Griffiths: Introduction to Electrodynamics, PHI

Course No.	Subject	Teaching Periods		Credits
		Lect	Tut	
ECE4517B	**Digital Electronics and Logic Design**	3	1	4

Section	Course contents	hours
1.	Review of Number systems, Radix conversion, Binary and Hexadecimal Arithmetic.9's ,10's, 1's & 2's complements and their usage, Binary codes(Weighted and non-Weighted), Error detecting and Correcting codes, Applications of various binary digital codes.	6
2.	I nt r o d uc t i o n t o B oo l e a n A l ge b r a , Theorems of Boolean algebra, Canonical forms, Representation of logical functions using Boolean Algebra, Truth Tables and Simplification using Boolean functions, Karnaugh map and Tabulation method	6
3.	Basic Logic Gates, Implementation of Boolean functions using various logic gates. Implementation of various Boolean functions using AND-OR-NOT ,NAND-NAND,NOR-NOR, OR-AND-NOT and DEDICATED Gate logic.	5
4.	**Digital Logic Families:** Introduction to bipolar Logic families:DDL, RTL, DTL, TTL, ECL and MOS Logic families: NMOS, PMOS, CMOS, Details of TTL logic family- Totem pole, Open collector outputs, TTL subfamilies, Comparison of different logic families on the basis of design parameters.	10
5.	Multiplexers and De-multiplexers, Encoders and Decoders, Code Converters, Adders, Subtractors, Multipliers, Parity Checker and Magnitude Comparator. Multiplexer and decoder logic. Implementation of various Boolean functions using multiplexer and decoder logic.	9
6.	**Introduction to Sequential logic,** Flipflops-SR,JK,D and T flipflops- Level triggering and edge triggering, Excitation tables-Counters-Asynchronous and synchronous Type Modulo counters, design with state equation state diagram, Shift registers.	10
7.	Memory organization, Classification, and characteristics of memories, Sequential memories, ROMs, R/W memories, Content Addressable memories, CCD memory, PLA, PAL and Gate Array.	6
TOTAL HOURS FOR THE COURSE		**52**

References

1. Anil K. Maini, "Digital Electronics", Wiley.
2. Malvino and Leach, "Digital principles and Applications" Tata Mc Graw Hill.
3. Jain R P, "Modern Digital Electronics", Tata Mc Graw-Hill, Third Edition,(2003)
4. Mano M. Morris, "Digital Design", Pearson Education, Third Edition,(2006)
5. Flecther, "An Engineering Approach to Digital Design", Prentice Hall of India, New Delhi.
6. Tocci Ronald J, "Digital Systems- Principles and Applications" Prentice Hall of India, New Delhi

Course No.	Subject	Teaching Periods	Credits
		P	
ECE4217BL	**Analog Electronics Circuits- II Lab**	2	1

List of Experiments

1. To assemble an RC phase shift oscillator.
2. To assemble a differential amplifier and obtain its CMRR.
3. To study different applications of OP AMPS.
    a. OP-AMP as an inverting amplifier.
    b. OP AMP as a non inverting amplifier
    c. OP AMP as an integrator
    d. OP AMP as a differentiator
4. To measure the following parameters of a typical OP-AMP.
    a. I/P Impedance
    b. O/P Impedance
    c. Slew rate
    d. CMRR
5. Obtain frequency response of an OP-AMP & hence find its bandwidth.
6. Study performance of multivibrator circuits using 555 chip in following modes:
    a. Bistable
    b. Astable
    c. Monostable
    d. Use of 555 Chip as a timer circuit.
7. To assemble a Schmitt trigger Circuit and to obtain its characteristics and to use it as squaring circuit.
8. To assemble a Class A Power amplifier and to determine its power gain
9. To study the performance of a voltage regulator IC Chip.

Course No.	Subject	Teaching Periods	Credits
		P	
ECE4517BL	**Digital Electronics and Logic Design Lab**	2	1

List of Experiments

1. To do the following:
   A. To verify the truth table of following logic gates:
      I. AND OR and NOT
      II. NAND, NOR, XOR and XNOR
   B. Design of Basic NOT, OR, AND, NAND, NOR Gates using DDL, RTL, DTL, TTL, and CMOS integrated circuits. Study of Open Collector, Open Drain and Totem-Pole Logic Family Configurations.
2. To implement XOR and XNOR using universal logic gates.
3.
   A. To verify De Morgan's law using logic gates.
   B. To implement certain Boolean expressions and check their equality.
4. To design and realize:-
   a. Half adder and verify its truth table.
   b. Full adder and verify its truth table.
   c. Half Subtractor and verify its truth table
   d. Full Subtractor and verify its truth table.
5. To design a multiplexer / demultiplexer using two input NAND gates
6. To design a 4 bit binary to decimal converter.
7. To design a modulo-10 counter.
8. Given a frequency f obtain the waveforms with frequencies f/2,f/5 & f/10.
9. Design and realize the following flip flops using logic gates.
   a. RS flip flop
   b. JK flip flop
   c. D flip flop
   d. T flip flop
10. Use PLL as:
    a. Frequency multiplier.
    b. Frequency demodulator.

Course No.	Subject	Teaching Periods	Credits
		P	
ECE4617BL	**Communication Systems-I / EMF Lab**	4	2

A. Communication Systems-I Lab:

1. Generation and detection of amplitude modulated signals.
2. Generation and detection of frequency modulated signals.
3. To measure sensitivity, selectivity, and fidelity of a radio receiver.
4. To generate PAM and PDM signals using IC 555.
5. To test a pulse code modulator.
6. To measure the noise figure of the following systems:
    a. A.M. System.
    b. F.M. System.

7. Familiarization with various Communication Techniques/Technologies using various Trainer Kits.

B. EMF Lab

1. Study of Transmission Line Concepts using Trainer Kit.