SYLLABUS

For

B.TECH. PROGRAMME

In

ELECTRONICS & COMMUNICATION ENGINEERING

INSTITUTE OF TECHNOLOGY

UNIVERSITY OF KASHMIR

ZAKURA CAMPUS

SRINAGAR, J&K, 190006

3rd Semester

Course No	Subject	*Teaching Periods*			*Credits*
		Lect	*Tut*	*Prac*	
MTH3117B	**Engineering Mathematics-III**	3	1	0	4
ECE3217B	**Network Analysis and Synthesis**	3	1	0	4
ECE3317B	**Analog Electronic Circuits-I**	3	2	0	5
ECE3417B	**Signals and Systems**	3	1	0	4
ECE3517B	**Material Science**	3	1	0	4
ECE3217BL	**Network Analysis and Synthesis Lab**	0	0	2	1
ECE3317BL	**Analog Electronic Circuits Lab – I**	0	0	2	1
ECE3617BL	**EDA Tools Lab**	0	0	4	2
Total		15	6	8	25

Course No	Subject	Teaching Periods		Credits
		Lect	Tut	
MTH3117B	Engineering Mathematics-III	3	1	4

Section	Course contents	hours
1.	Laplace transform, shifting theorem	4
2.	Laplace transform of differential functions	4
3.	Heaviside's unit step function	2
4.	Dirac-delta function and its laplace transform	2
5.	Heaviside's expansion theorem	2
6.	Inverse laplace transform	4
7.	initial and final value theorem	3
8.	Convolution theorem	1
9.	Applications of laplace transform in the solution of linear differential equations	4
10.	Fourier series, Harmonic Analysis	4
11.	Definition of Fourier transform, Fourier sine and Cosine Transform	3
12.	Fourier integral formulla	2
13.	Applications to solutions of BVP	2
14.	Z- transform, Definition , Linearity property	2
15.	Z- transform of elementary functions	3
16.	Shifting theorems,	2
17.	Initial and final value theorems, convolution theorem	3
18.	Inversion of Z- transform.	3
TOTAL HOURS FOR THE COURSE		**50**

References

1. Laplace Transforms by Murray R. Speigal
2. Advanced Engg. Mathematics: Erwin Kreyzing- Wiley Eastern. Pub.
3. Higher Engg. Mathematics: B.S. Grewal - Khanna publishers.
4. Advanced Engineering Mathematics: Michael D Greenberg-PHI.
5. Higher engineering mathematics: H. K. Dass, Rajnish Verma-S. Chand

Course No.	Subject	Teaching Periods		Credits
		Lect	Tut	
ECE3217B	Network Analysis and Synthesis	3	1	4

Section	Course contents	Hours
1	Charge and energy, capacitance, inductance and resistance parameters in the light of field and circuit concepts.	3
2	Approximate realization of a physical system as a circuit. Reference directions for currents and voltages, conventions for magnetically coupled circuits, Circuit topology.	4
3	First order differential equation: Differential equations as applied in solving networks. Application of initial conditions. Evaluating initial conditions in networks.	6
4	Laplace Transformations. Wave form analysis and Synthesis; The unit step, ramp and impulse functions and Laplace transforms. Initial and final value theorem, Convolution integral, convolution as summation	6
5	Network theorems and impedance functions: Complex frequency, transformer impedance and transform circuits, series and parallel combination of elements	5
6	Network Functions – Poles and Zones: Ports of terminal pairs. Network functions for one port and two port network. Time domain behaviour from poles zero plot.	5
7	Two port parameters: Relationship between two-port parameters. Admittance, impedance, transmission and hybrid parameters.	6
8	Relationship between parameter sets. Parallel connection of two port Networks. Characteristic impedance of two port networks.	5
9	Filters Filter fundamentals - pass & stop band, filter classification.	5
10	Constant-k and m-derived Filters	5
TOTAL HOURS FOR THE COURSE		**50**

Books Recommended

1. Network Analysis by Van Valkenberg
2. Network Analysis & Synthesis by F. Kuo
3. Network Analysis by G.K.Mittal

Course No.	Subject	Teaching Periods		Credits
		Lect	Tut	
ECE3317B	Analog Electronic Circuits-I	3	2	5

Section	Course contents	Hours
1	Bipolar Junction Transistors (BJT) fundamentals: transistor configurations, DC operating point, BJT characteristics & parameters, fixed bias,	3
2	emitter bias with and without emitter resistance, analysis of above circuits and their design,	2
3	variation of operating point and its stability.	3
4	BJT AC Analysis	3
5	BJT Transistor Modeling, The re transistor model, Common emitter fixed bias, Voltage divider bias, Emitter follower configuration.	3
6	Emitter follower configuration;Complete Hybrid equivalent model, Hybrid π Model.	2
7	Multistage Amplifiers: Need for multistage amplifier, Gain of multistage amplifier, Different types of multistage amplifier like RC coupled,	3
8	transformer coupled, direct coupled, and their frequency response and bandwidth.	2
9	Feedback Basics: Negative feedback, Effect of negative feedback on the performance of amplifiers e.g. on bandwidth.	3
10	Types of feedback amplifiers, current shunt, current series,	5
11	voltage shunt, and voltage series feedback. Analysis of feedback amplifiers circuits.	3
12	Field Effect Transistors: Construction	3
13	Characteristics of JFETs, Transfer Characteristics,	3
14	Depletion type MOSFET, Enhancement type MOSFET. ,	3
15	FET Amplifiers: JFET small signal model, Fixed bias configuration,	3
16	Self bias configuration, Voltage divider configuration,	2
17	Common Gate configuration.	2
18	Source-Follower Configuration, Cascade configuration.	2
TOTAL HOURS FOR THE COURSE		**50**

References:

1. Robert L. Boylestad and Louis Nashelsky, “Electronics devices and Circuit theory”, Pearson
2. Adel S. Sedra and Kenneth C. Smith, “Micro Electronic Circuits Theory and Application,”
3. Fundamentals of Microelectronics, Behzad Razavi, John Wiley
4. J.Millman & C.C.Halkias―Integrated Electronics, TMH
5. K. A. Navas, “Electronics Lab Manual”, Volume I, PHI

Course No.	Subject	Teaching Periods		Credits
		Lect	Tut	
ECE3417B	Signals and Systems	3	1	4

Section	Course contents	hours
1	Introduction to Signals & Systems: Definition of a signal & System, Classification of Signals, Basic operations on Signals, Elementary Signals	3
2	Systems viewed as interconnection of operations, Properties of Systems, Sampling theorem, Graphical & Analytical proof of Band-limited signals	4
3	Impulse Sampling, Aliasing.	3
4	Linear Time Invariant (LTI) Systems:	2
5	Time-Domain representation & Characterization of LTI systems,	3
6	Impulse response representation, Convolution integral & Convolution sum,	5
7	properties of LTI systems, Stability criteria for LTI systems, Elements of Continuous time & Discrete-time LTI systems.	2
8	Fourier Representation of Signals Fourier representation of Signals, Continuous -time Fourier series and their properties	4
9	Application of Fourier series to LTI systems, Fourier Transform & its properties,	3
10	Applications of Fourier Transform to LTI systems, Discrete-time Fourier Transform & its properties.	3
11	Circular Convolution, Relationship to other transforms.	1
12	Laplace Transform: Introduction & Definition, Region-of- convergence,	1
13	Properties of Laplace transform, Inverse Laplace Transform, Applications of Laplace Transform in analysis of LTI systems,	5
14	Unilateral Laplace transform & its applications to solve differential equations, Analysis of Electric circuits	3
15	Z-Transform The Z-Transform, Region-of-convergence, properties of Z-Transform, Inverse Z-Transform,	4
16	Transform Analysis of Discrete-time LTI systems, Unilateral Z-Transform & its applications to LTI systems described by difference equations	4
TOTAL HOURS FOR THE COURSE		**50**

References

1. Signals & Systems by Haykins
2. Signals & Systems by Ziemer and Tranter
3. Signals & Systems by Oppenhiem

Course No.	Subject	Teaching Periods		Credits
		Lect	Tut	
ECE3517B	Material Science	3	1	4

S.No.	Topic	Hours
1	Crystal Structure: Fundamental concepts, Closed packed structures, Crystal systems, Crystallographic planes and directions, Miller indices, Point defects.	6
2	Free electron Theory , classification of solids into conductors ,Semiconductors and insulators, Effective mass	5
3	Dielectric Properties: Dielectric materials, Polarization mechanisms, Dipole moment, Dielectric strength, Methods for producing polarization, Application of dielectric materials.	6
4	Magnetic Properties: Basic concepts, Soft and hard magnetic materials, Ferrites, Selection techniques for applications, Magnetic recording, Magnetic memories.	5
5	Optical Properties: Index of refraction, Damping constant, Characteristic penetration depth and absorbance, Reflectivity and transmissivity, Atomic theory of the optical properties, Optical storage devices	7
6	Device Materials: Materials for resistors, capacitors and inductors. Superconductivity: Properties of superconductors, Applications of superconductors.	6
7	Semiconductor Materials: Intrinsic and extrinsic materials, Electron and hole concentrations at equilibrium, Temperature dependence of carrier concentrations, Conductivity and mobility,	6
8	Effect of temperature and doping on mobility, Direct and indirect recombination of electron and holes, Diffusion and drift of carriers, Diffusion length, Contact potential. Hall Effect and its Applications.	6
9	Si, Ge, GaAs and other binary semiconductors.	3
Total Hours		50

References:

1. Hummel R E, “Electronic Properties of Materials”, Narosa Publishing House.
2. William D Callister, Jr “Materials Science and Engineering”, John Wiley and Sons, Inc.
3. Dekker A J “Solid State Physics”, Mac Millan, India Limited, Madras.
4. Pillai S O “SolidStatePhysics”,New Age International Publishers.
5. Van Vlack L H “Elements of Material Science and Engineering”, Addison Wesley Publishers
6. Streetman B G and Banerjee S “Solid State Electron Devices”, Prentice Hall of India.

Course No.	Subject	Teaching Periods	Credits
		P	
ECE3217BL	**Network Analysis and Synthesis Lab**	2	1

List of Experiments

1. Study of CRO - Measurement of Voltage frequency and Phase of a given waveform.
2. To assemble RC circuits and observe its performance in low pass and high pass mode.
3. To measure image & characteristic impedance of a symmetrical Tee and Pi networks.
4. For a given two port network measure:
   i) ABCD parameters.
   ii) h - parameters.
5. To experimentally determine the characteristic impedance and to plot the attenuation characteristics of the following circuits.
   i) Prototype low pass filter.
   ii) Prototype high pass filter.
   iii) Prototype band-pass filter.
   iv) m-derived LPF.
   v) m-derived HPF

Course No.	Subject	Teaching Periods	Credits
		P	
ECE3317BL	**Analog Electronic Circuits Lab-I**	2	1

List of Experiments

1. Study I-V characteristics of:
   a. PN junction diode
   b. zener diode
   c. varactor diode
   d. light emiting diode
   e. tunnel diode

   Calculation of DC and dynamic resistance in each case.
2. Study I/O characteristics of photodiode.
3. Study V-I characteristics of transistor (PNP and NPN) and calculate the performance parameters of a transistor in CB, CE and CC Configurations.
4. To assemble a CB amplifier with various biasing configurations and observe i t s performance.
5. To assemble a CE amplifier with various biasing configurations and observe it s performance.
6. To assemble a CC amplifier and observe it s performance.
7. To assemble a two stage RC-coupled amplifier and observe its output.
8. To assemble a two stage transformer-coupled amplifier and observe its output.
9. To design a practical amplifier using transistors with given specifications and parameters
10. To Study V-I characteristics of JFET and MOSFET. Determination of their performance parameters.
11. To Study various FET and MOSFET configurations and their practical application. Circuits
12. To do the following:
    a. To assemble current series feedback amplifier and study its performance.
    b. To assemble current shunt feedback amplifier and study its performance.
    c. To assemble a voltage shunt feedback amplifier and study its performance.
    d. To assemble a voltage series feedback amplifier and study its performance.

Course No.	Subject	Teaching Periods	Credits
		P	
ECE3617BL	**EDA Tools Lab**	4	2

List of Experiments

A: MULTISIM/PROTEUS/ORCAD/PSPICE

1.

a) To Simulate a half wave and a full wave rectifiers (bridge and center-tapped) and to study their performance.

b) To suppress the ripple of half wave rectifier, bridge and center-tapped rectifiers using RC filter.

2. To Simulate Zener diode as a voltage regulator
3. To Design & simulate Zener diode based voltage regulated power supply with short circuit protection.
4. To Design & simulate an IC voltage regulator based power supply of 5v, 9V& 12V.
5. To Simulate and observe the performance of clipping and clamping circuits.
6. To Simulate a CB amplifier and observe it s performance.
7. To Simulate a CE amplifiers with various biasing configurations.
8. To Simulate a CC amplifiers with various biasing configurations.
9. To Design & Simulate a two stage RC-coupled amplifier and observe its output.
10. Simulation &Verification of the truth tables of TTL gates (7400, 7402, 7404, 7408, 7432, 7486….).
11. Simulation & Verification of NAND and NOR gates as universal logic gates and implement all other gates using these universal gates.
12. Simulation and verification of truth tables of various combinational circuits like encoders, decoders, multiplexers, demultiplexers, priority encoders, magnitude comparators, display decoders, adders, subtractors, etc.
13. Design and Simulation of basic NOT, OR, AND, NAND, NOR gates using DDL,RTL,DTL,TTL & CMOS integrated circuits.
14. Design & Simulation of various flip-flops like SR, JK, D and T, WITH VARIOUS SYNCHRONOUS AND ASYNCHRONOUS INPUTS AND CONFIGURATIONS.

B: MATLAB/SIMULINK:

1 .Basic Array Operations
2. 2D plotting and 3D plotting.
3. Control structure programming.
4. Working with audio and pictures.

C: LAB VIEW:

1. Computing expressions using graphical programming.
2. Creating a VI to find the decimal equivalent of a binary number.
3. Creating a sub VI to find Grey Code Equivalent ofa BCD number.
4. Create a VI to display a waveform chart.
5. Build a VI to generate a sine waveform with options to vary amplitude,frequency and offset.