SYLLABUS

FOR

B.TECH. PROGRAMME

IN

ELECTRICAL ENGINEERING

INSTITUTE OF TECHNOLOGY

ZAKURA CAMPUS
UNIVERSITY OF KASHMIR
SRINAGAR J&K, 190006
As Per BOS Held In August 2017

COURSE STRUCTURE
B.Tech 4th Semester ELE
University of Kashmir, Zakura Campus

Course Code	Course Title	Teaching Periods per week			Credits
		L	T	P	
MTH4117B	Engineering Mathematics – IV	3	1	0	4
ELE4217B	Electrical Machines – II	3	1	0	4
ELE4317B	Control Systems – I	3	1	0	4
ELE4417B	Analog Electronic Circuits	3	1	0	4
ELE4517B	Digital Electronics and Logic Design	2	1	0	3
ELE4617B	Fluid Dynamics & Hydraulic Machines	2	1	0	3
ELE4217BL	Electrical Machines Lab	0	0	2	1
ELE4417BL	Analog Electronic Lab	0	0	2	1
ELE4517BL	Digital Electronics and Logic Design Lab	0	0	2	1
Total		16	6	6	25

Applicable To Batch 2016 & Onwards

FOURTH SEMESTER

COURSE CODE: MTH-4117B

ENGINEERING MATHEMATICS - IV

Credits: 04

S. No	Topics	Number of Hours
1.	Finite Difference: Difference Table and its usage. The difference operators $\Delta, \blacktriangledown$ and the operator E	06
2.	Interpolation: Interpolation with equal intervals, Newton's advancing difference formula. Newton's backward difference formula. Interpolation with unequal intervals. Newton's divided difference formula. Lagrange's interpolation formula	08
3.	Central Differences: The central difference operator δ and the over-raging operator μ. Relations between the operators. Gauss forward and backward interpolation formula, Sterling's, Bessel's, Laplace and Everett's formulae	08
4.	Numerical solution of algebraic and Transcendental Equations: Graphic Method, Regula-Fast method, Bolzano's Process of bisection of intervals, Newton-Raphson Method and its geometrical significance	10
5.	Numerical Integration: Numerical Integration, General Quadrature Formula, Simpson's one-third and three-eight rules, Weddle's' rule, Hardy's rule, Trapezoidal rule.	08
6.	Numerical Solution of ordinary differential equations: Numerical solution of ordinary differential equations, Picard's method. Taylors series method, Euler's method, Runge-Kutta Method	10
Total number of Hours		50

TextBooks:

S.No	Name of Book	Author	Publisher
1.	Numerical Methods for Scientists and Engineering	M.K.Jain, S.R.Iyengar& R.K. Jain, Wiley Eastern Ltd	New age publishers
2.	Mathematical Numerical Analysis	S.C. Scarborough	CBS Publishers and distributors
3.	Introductory methods in Numerical Analysis	S.S.Sastry	PHI learning Pvt Ltd
4.	Numerical Methods for Mathematics, Sciences and Engg	J. H. Mathews	Prentice hall college division
5.	Fundamentals of Mathematical Statistics	S.C.Gupta and V.K.Kapoor	S. Chand
6.	Statistical Theory and Methodology in Science and Engineering	Brownlee	Krieger publishers co
7.	Introduction to Mathematical Statistics	R.E. Walpole 3rd edition	Prentice hall

COURSE CODE: ELE-4217B

ELECTRICAL MACHINES – II

Credits: 04

S. No	Topics	Number of Hours
1.	Basic Concepts in A.C. Rotating Electrical Machines: The rotating magnetic field, Magneto-motive force and flux distribution, Induced voltage, Production of torque, Leakage fluxes, losses and efficiency	5
2.	Induction Machines: Three Phase Induction Motors: Construction, Types, Principle of operation of an induction motor, Cogging and crawling, Equivalent circuit, Torque/speed characteristics, Induction motor tests, Speed control, Principle of operation of Induction generator.	13
3.	Single-Phase Motors: Types of single phase induction motors, Starting of single phase induction motors, analysis and testing of single phase induction motors, universal motor, Schrage motor, Applications of single phase motors.	6
4.	Synchronous Machines: Construction & Types, working principle, field and armature windings, Equivalent circuit, voltage regulation and its determination, Synchronous reactance, saturation effect, parallel operation, Two-axis theory.	13
5.	Salient type machines, steady-state power-angle characteristics, Excitation systems, V-curves, synchronous capacitors, Hunting, synchronous Machine Transients, Analysis of sudden 3-phase short circuit, Transient power-angle characteristics.	13
Total number of Hours		50

TextBooks:

S.No	Name of Book	Author	Publisher
1.	Electric Machinery by Fitzgerald	Kingslay, Umans	Tata Mcgraw hill
2.	Electric Machines	Nagrath and Kothari	Tata Mcgraw hill
3.	Electric Machines	Guru	Oxford university press
4.	Electrical Machines and Transformers	GerogeMcPherson	John Wiley
5.	Electric Machinery Fundamentals	Chapman	Tata Mcgraw hill
6.	Electric machinery and Transformers	Irving Kosow	Pearson
7.	Alternating current machinery	Langsdorf	Tata Mcgraw hill

COURSE CODE: ELE-4317B

CONTROL SYSTEMS – I

Credits: 04

S. No	Topics	Number of Hours
1.	Introduction to continuous control systems: Definition of a control system, open-loop, closed loop (automatic and manual) control.	04
2.	Mathematical modeling: Transfer functions, block diagrams, Mason's signal flow graph	09
3.	First and second order system: Example of first and second order systems, responses of these systems to step, ramp, parabolic and sinusoidal inputs, transient, steady state and error analysis	10
4.	Stability studies: Definition of stability, stability and pole locations, Routh Table	09
5.	Frequency response: Bode plot, polar plot, Nyquist's criterion, root locus.	08
6.	Proportional, Integral, Derivative (P.I.D) control. Compensator design Lead – lag compensators . Modelling of dynamic systems in state space (Introduction).	10
Total number of Hours		50

TextBooks:

S.No	Name of Book	Author	Publisher
1.	Control Systems Engineering	Norman S. Nise	John wiley
2.	Control systems(Principles and Design)	M.Gopal	Tata McGraw-Hill Publishing
3.	Control systems	A.Anand Kumar	PHI Learning Private limited
4.	Feedback control of dynamic systems	Franklin and Powel.	Prentice Hall
5.	Design of feedback control systems	Stefani	Oxford university press

COURSE CODE: ELE-4417B

ANALOG ELECTRONIC CIRCUITS

Credits: 04

S. No	Topics	Number of Hours
1.	**BJTs** Brief review of BJTs, Analysis and Design of transistor amplifier circuits using h parameters, Low frequency h- parameter model. High frequency hybrid – pi model, analysis and design of transistor amplifier circuits at high frequencies, Multistage amplifiers.	8
2.	**Feedback Basics** Negative feedback, Effect of negative feedback on the performance of amplifiers e.g. on bandwidth. Types of feedback amplifiers, current shunt, current series, voltage shunt and voltage series feedback. Analysis of feedback amplifiers circuits	8
3.	**Sinusoidal Oscillators** Basic operations, analysis of general oscillator circuit, Barkhausen's criteria, various types of oscillator circuits and their analysis, Design of practical oscillator circuits.	7
4.	**Power Amplifiers and Power Supplies** Classification of power amplifiers, Class A, Class B, Class AB and Class C power amplifiers; analysis and design. Power supplies and IC regulators	8
5.	**Operational Amplifiers** Operational amplifiers stages, Differential amplifier, CMRR, Cascade amplifier, Ideal and practical operational amplifier characteristics and properties Op-amp applications, inverting and non-inverting amplifiers, difference amplifier, summer, differentiator and integrator, rectifiers etc. Op-amp in analog computation. Frequency response, Gain Bandwidth product, Signal to noise ratio.	12
6.	**Multivibrators and Wave Form Generators** Bistable multi vibrators, Bistable circuit as a memory element, Generation of Square & Triangular waves using A stable multi vibrators, Generation of the standard Pulse-The Monostable multivibrators, Integrated circuit Timers, Implementation of Astable, Monostable and Bi stable multi vibrators using 555Timer, Various practical applications of555 Timer.	7
Total number of Hours		50

TextBooks:

S.No	Name of Book	Author	Publisher
1.	Integrated circuits	Millman&Halkias	Tata Mc-Graw Hill
2.	Microelectronic circuits	Sedra and Smith	Oxford university Press
3.	Introduction to Electronic Circuit Design	Spencer and Ghausi	Pearson
4.	Op-Amps and Linear Integrated Circuits	RamakantGaekwad	Pearson

COURSE CODE: ELE-4517B

DIGITAL ELECTRONICS AND LOGIC DESIGN

Credits: 03

S. No	Topics	Number of Hours
1.	Review of Number systems, Radix conversion Complements9's&10's, Subtraction using1's&2'scomplements	04
2.	Binary codes, Error detectingand Correcting codes, Theorems of Boolean algebra, Canonical forms,	04
3.	Logic gates and implementation of Boolean functions with various types of logic gates. Circuit equivalence.	06
4.	Digital Logic Families: Introduction to bipolar Logic families: RTL, DCTL, 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.	06
5.	Simplification techniques and minimization by map methods. Tabular method.	04
6.	Combination logic and arithmetic circuits. Encoders and Decoders, multiplexes & de-multiplexes.	04
7.	Sequential circuits –state diagrams and state tables, design and analysis of flip-flops, registers, counters. Synchronous and asynchronous operation of sequential circuits. Analog to digital convertor, digital to analog convertor.	06
8.	Latches and memory organisation. ROM's, EPROM's and RAM's –Dynamic and static.	04
9.	Introduction to PLA's	01
Total number of Hours		39

TextBooks:

S.No	Name of Book	Author	Publisher
1.	Digital logic	M. Moris Mano	Pearson
2.	Digital principles and applications	A.P. Malvino	Tata Mcgraw hill
3.	Switching circuits	Marcus	Prentice hall
4.	Digital Electronics	Anil K. Maini	Wiley

COURSE CODE: ELE-4617B

FLUID DYNAMICS AND HYDRAULIC MACHINES

Credits: 03

S. No	Topics	Number of Hours
1.	INTRODUCTION:PHYSICAL Properties of Fluids.	03
2.	Fluid Statics: Pressure Intensity, Pascal's law, pressure-density height relationships, manometers, pressure on plain and curved surfaces, centre of pressure.	05
3.	Kinematics of Fluid Flow:Types of flows, stream line, streak line and path line, continuity equation.	04
4.	Dynamics of fluid Flow: Euler's equation of motion along a stream line and its integration to yield Bernoulli's equation, Flow measurement, pitot tube, prandtl tube, Venturimeter, orifice meter, orifices and mouthpieces, Weirs and Notches.	07
5.	Flow through Pipes: Hydraulic grade line, Darcey-Weisbachh formula, Design of pipes, Equivalent diameter of pipes, Transmission of power through pipes.	06
6.	Flow in open Channels: Chezy's formula, Maining's formula. Design of Cannels, Economic section.	05
7.	Hydraulic Machines: Types of turbines, description and principles of Impulse and reaction turbines, unit quantities and specific speed, run a ay speed, turbine characteristics, selection of turbines, governing of turbines, centrifugal pumps, specific speed, Power requirement, Reciprocating pumps.	07
8.	Layout of power House: General layout and arrangement of Hydropower units.	02
Total number of Hours		39

TextBooks:

S.No	Name of Book	Author	Publisher
1.	Fluid Mechanics & Fluid Power Engineering	Dr D.S.Kumar	S.K.Kataria& Sons
2.	Engineering Fluid Mechanics	R.J.Garde&A.G.Miraj	Scitech Publication
3.	A textbook of Fluid & Hydraulic Machines	Dr R.K Bansal	Laxmi Publication

COURSE CODE: ELE-4217BL

ELECTRICAL MACHINES LAB

Credits: 01

S. No.	Experiment
1.	To perform open circuit and short circuit tests on a single-phase transformer
2.	To perform polarity test on a single phase transformer
3.	To determine the efficiency and voltage regulation of a single phase transformer
4.	To study three phase connections on a bank of three single phase transformers
5.	To study various parts of a dc machine and draw sketches of the same
6.	To plot the saturation curve of a dc machine
7.	To plot the external characteristics of a separately excited dc generator.
8.	To study the voltage build-up of a dc shunt generator
9.	To plot the external characteristic of a dc shunt generator.
10.	To plot the external characteristics of a dc series generator.
11.	To plot the external characteristic of a dc compound generator.
12.	To study the different parts of an Induction motor.
13.	To determine the equivalent–circuit parameters of a 3 -ϕ Induction motor by (i) No load test (ii) Blocked rotor test
14.	To determine the Torque / speed characteristics of a 3-ϕ Induction motor
15.	To study the speed control of an Induction motor by pole-changing method
16.	To study the speed control of an Induction motor by varying voltage
17.	To study the speed control of an Induction motor by changing rotor resistance
18.	To Study of the construction of a synchronous machine
19.	To obtain the OCC and SCC of a synchronous machine by Synchronous impedance method
20.	To find voltage regulation of an alternator by actual loading
21.	To obtain the V-curves and inverted V-curves of a synchronous motor
22.	To conduct slip-test on a salient-pole synchronous machine and hence determine its direct and quadrature – axis reactances

COURSE CODE: ELE-4417BL

ANALOG ELECTRONIC LAB

Credits: 01

S. No.	Experiment
1.	Study V-I characteristics of transistor (PNP and NPN) and calculate the performance parameters of a transistor in CB, CE and CC Configurations.
2.	To assemble a CE amplifier and observe its performance.
3.	To obtain frequency response of a RC coupled CE amplifier.
4.	To assemble an emitter follower circuits and observe its performance.
5.	To assemble a differential amplifier and obtain its CMRR
6.	To study different applications of OP AMPS. inverting amplifier, non-inverting amplifier, integrator, differentiator
7.	To assemble an RC phase shift oscillator.
8.	Study performance of multi vibrator circuits using 555 chip in following Modes: Bistable, Astable, Monostable, Use of 555 chip as a timer circuit.
9.	To assemble a Schmitt trigger circuit. And to obtain its characteristics and to use it as Squaring circuit.
10.	To assemble a Class A power amplifier and to determine its power gain.
11.	To study different applications of OP-AMPS. i. OP- AMP as an inverting amplifier. ii. OP-AMP as a non-inverting amplifier. iii. OP-AMP as an integrator. iv. OP-AMP as a differentiator.
12.	To study the performance of a voltage regulator IC chip.
13.	To measure the following parameters of a typical OP-AMP. i. I/P Impedance ii. O/P Impedance iii. Slew rate iv. CMRR v. Freq. response.

COURSE CODE: ELE-4517BL

DIGITAL ELECTRONICS AND LOGIC DESIGN LAB

Credits: 01

S. No.	Experiment
1.	To verify the truth table of following logic gates: AND, OR and NOT NAND, NOR, XOR and XNOR
2.	To realize the above gates using discrete active and passive components
3.	To implement XOR and XNOR using universal logic gates
4.	To verify DE Morgan's law using logic gates
5.	To implement certain Boolean expressions and check their equality
6.	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
7.	To design a multiplexer/ demultiplexer using two input NAND gates
8.	To design a 4-bit binary to decimal convertor
9.	To design a modulo 10 counter
10.	Given the frequency f obtain the waveforms with frequencies f/2, f/5 & f/10
11.	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.
12.	Use PLL as a) Frequency multiplier, b) Frequency demodulator