NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **Electrical Engineering**

1 Subject Code **ELE-501** Course Title **POWER SYSTEMS-I**

2 Contact Hours | L | 3 | T | 1 | P | 0 |

3 Examination Duration (Hrs): | Theory | 0 | 3 | Practical | 0 | 0 |

4 Relative Weightage | M-I | 2 | 0 | M-II | 2 | 0 | Asm | 1 | 0 | ME | 5 | 0 | PRE | 0 | 0 |

5 Credits: | 0 | 4 | 5th Semester | √ (Autumn) | | (Spring) |

6 **Objective:**
The main objective of the course is to understand the structure of Electric power system and its different components.

7. **Details of the Course:**

S.No	Particulars	Contact Hours
1.	Introduction to Power Systems generation, transmission & distribution. Element of AC distribution. Single fed, double fed and ring main distributor.	06
2.	overhead line insulator types; pin, suspension, strain, schackle, guy etc. String efficiency & methods of equalizing potential drop over string of suspension insulators.	08
3.	Transmission line parameters and their evaluations, types of overhead conductors with calculations of inductance and capacitance. Models of short, medium and long transmission lines. Skin, proximity and Ferranti effect. Power transfer capability of a transmission line. Mechanical Design of transmission line. Electric Power Transmission Towers.	16
4.	Classification of cables, Cable conductors, insulating materials, insulation resistance, electrostatic stress, grading of cables, capacitance calculation, losses and current carrying capacity. Location of faults. Location of faults, methods of laying of underground cables.	08
5.	Corona, Visual & critical voltages, corona loss, effect of corona on line design practical considerations	04
	Total Contact Hours	42

8. **Suggested Books:**

S.No	Name of Book	Author	Publisher	Year of Publication
1	Power System Analysis	J.J. Grainger and W.D Stevenson	Mcgraw hill	1994
2	Electric Power Systems	B.W. Weedy and B.J. Cory	John Wiley and sons	1998
3	Electric Power Systems	C.L. Wadhwa	New age international	2010
4	Power System Engineering	Nagrath and Kothari	Tata Mcgraw hill	2007
5.	Transmission and Distribution of Electrical Energy	H.Cotton	Hodder Arnold	3rd Revised edition, 1970

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **Electrical Engineering**

1 Subject Code **ELE-502** Course Title **ELECTRICAL MACHNINES - II**

2 Contact Hours | L | 3 | | T | 1 | | P | 2 |

3 Examination Duration (Hrs): | Theory | 0 | 3 | | Practical | 0 | 0 |

4 Relative Weightage | M-I | 2 | 0 | | M-II | 2 | 0 | | Asm | 1 | 0 | | ME | 5 | 0 | | PRE | 0 | 0 |

5 Credits: | 0 | 5 | 5th Semester | √ Autumn | | Spring |

6 **Objective:**
The objective of the course is to study the various types of conventional and advanced motors , generators and transformers. It helps to build a strong foundation in an electrical power system.

7. **Details of the Course:**

S.No	Particulars	Contact 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	2
2.	Induction Machines a. Three Phase Induction Motors Principle of operation of an induction motor, Construction, Types, Equival circuit, Torque/speed characteristics, Induction motor tests, Starting, Sp control, Induction generator, Schrage Motor, Circle Diagram, Applications selection b. Single-Phase Induction Motors Types of 1-phase induction motors, analysis and testing of 1-phase induction motors, universal motor	22
3.	1. Synchronous Machines Constructional features, Types and working principle, windings, Equivalent circui voltage regulation and its determination, saturation effect, parallel operation, Two axis theory, 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.	18
	Total Contact Hours	42

8. **Suggested Books:**

S.No	Name of Book	Author	Publisher	Year of Publication
1	Electric Machinery by Fitzgerald	Kingslay, Umans	Tata Mcgraw hill	2002
2	Electric Machines	Nagrath and Kothari	Tata Mcgraw hill	2010
3	Electric Machines	Guru	Oxford university press	3rd edition 2000
4	Electrical Machines and Transformers	Geroge Mc Pherson	John Wiley	1990
5.	Electric Machinery Fundamentals	Chapman	Tata Mcgraw hill	2010
6.	Electric machinery and Transformers	Irving Kosow	Pearson	2007
7.	Alternating current machinery	Langsdorf	Tata Mcgraw hill	2009

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: Electrical Engineering

1 Subject Code ELE-502P Course Title **ELECTRICAL MACHINES LABORATORY –II**

2 Contact Hours | L | 0 | T | 0 | P | 2 |

3 Examination Duration (Hrs): | Theory | 0 | 0 | Practical | 0 | 2 |

4 Relative Weightage | MSLE | 2 | 5 | ESLE | 2 | 5 |

5 Credits: | 0 | 1 | 3rd Semester | √ Autumn | | Spring |

6 **Objective:**

The objective of the lab is to familiarize the students with the different electric machines, their operation and working.

7. Lab. Experiments:

S.No	Experiments
1	To study the different parts of an Induction motor. To determine the equivalent–circuit parameters of a 3 -ϕ Induction motor by (i) No load test (ii) Blocked rotor test
2	To determine the Torque / speed characteristics of a 3-ϕ Induction motor
3	To determine the speed characteristics of a schrage motor
4	To study the speed control of an Induction motor by pole-changing method
5	To determine the speed / Torque characteristics of an AC series motor (Universal motor)
6	To determine the equivalent circuit parameters of a 1-ϕ Induction motor by (i) No load test (ii) Blocked rotor test
8	Study of the construction of a synchronous machine
9	To obtain the OCC and SCC of a synchronous machine by Synchronous impedance method
10	To synchronize an alternator with bus bars using bright / dark lump method
11	. To find voltage regulation of an alternator by actual loading
12	To obtain the V-curves and inverted V-curves of a synchronous motor
13	To conduct slip-test on a salient-pole synchronous machine and hence determine its direct and quadrature – axis reactances

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **Electrical Engineering**

1 Subject Code **ELE-503** Course Title **CONTROL SYSTEM-II**

2 Contact Hours | L | 2 | | T | 1 | | P | 2 |

3 Examination Duration (Hrs): | Theory | 0 | 3 | | Practical | 0 | 0 |

4 Relative Weightage | M-I | 2 | 0 | | M-II | 2 | 0 | | Asm | 1 | 0 | | ME | 5 | 0 | | PRE | 0 | 0 |

5 Credits: | 0 | 4 | 5th Semester | √ Autumn | | Spring |

6 **Objective:**

This course deals with the modern control theory, non linear control and advanced control techniques. The course is organized in such a fashion that the students will develop lot of interest in research activity.

7. **Details of the Course:**

S.No	Particulars	Contact Hours
1.	State variable modeling. Block diagram, transfer function and signal flow graphs in state space	08
2.	State variable analysis and design solution of state vector equations, design using state – variable feed back. Controllability and observability.	14
3.	Digital control system: Hardware elements of a digital control system, Z- transform, inverse Z-transform, difference equations, pulse transfer function. Discrete time system analysis	10
4.	Non linear control systems. Linearization of Non-linear control system about and nominal operating point, analysis and design using linearized models	04
5.	Advanced control techniques: a) Fuzzy logic control b) Adaptive control Neural Network based control	08
	Total Contact Hours	44

8. **Suggested Books:**

S.No	Name of Book	Author	Publisher	Year of Publication
1	State variable methods and digital control	M. Gopal	Tata Mcgraw Hill	2nd edition
2	Control system engineering	Norman .s. Nise	John Wiley	2009
3	Control systems	A. Anand Kumar	PHI Learning Pvt. Ltd	2009
4	Feedback control of dynamic systems	Franklin and powel	Prentice hall	5th edition

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: Electrical Engineering

1 Subject Code ELE-503P Course Title **CONTROL SYSTEMS & V I LAB.**

2 Contact Hours | L | 0 | T | 0 | P | 2 |

3 Examination Duration (Hrs): | Theory | 0 | 0 | Practical | 0 | 2 |

4 Relative Weightage | MSLE | 2 | 5 | ESLE | 2 | 5 |

5 Credits: | 0 | 1 | 3rd Semester | √ Autumn | | Spring |

6 **Objective:**

The objective of the lab is to make the students understand the applications of control system in day to day life.

8. Lab. Experiments:

S.No	Experiments
1	To study the performance of Relay control Combination of P, I and D control schemes in a typical thermal system (Oven).
2	To study the torque-speed characteristics of an AC servomotor
3	To study the time response of a variety of simulated linear systems
4	To study the role of feedback in a DC speed control system
5	To study the role of feedback in a DC position control system
6	Use of MATLAB / SIMULINK /Control System tool boxes
7	To study the role of a combination of P,I and D control actions in a variety of simulated linear systems
8	To study the computer simulation of a number of systems
9	System identification using frequency domain techniques
10	Lead/ lag compensator design
11	Microprocessor based PID control
12	Computer control of systems
13	Control of stepper motor
14	Control system (State Space)
'15	Fuzzy logic and neural network tool boxes

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **Electrical Engineering**

1	Subject Code	ELE-504		Course Title	**Computer Aided Simulation of Electrical Systems**					
2	Contact Hours			L	0	T	0	P	3	
3	Examination Duration (Hrs):			Theory	0	0		Practical	0	2
4	Relative Weightage			MSLE	2	5		ESLE	2	5
5	Credits:	0	2	3rd Semester	√ Autumn			Spring		

6 **Objective:**

The objective of the course is to make students analyze different control systems using MATLAB and SIMULINK tool boxes.

9. Lab. Experiments:

S.No	Experiments
1	Use of MATLAB in: 1. Analysis of D.C Circuits 2. Transient and steady state analysis of a.c/d.c circuits. 3. Analysis of control systems Analysis of Electric Machines and Transformers
2	Use of MATLAB and SIMULINK Tool boxes
3	Use of Control System (State Space), Fuzzy Logic & Neural Network Tool Boxes

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **Electrical Engineering**

1 Subject Code **ECE-508** Course Title **COMMUNICATION SYSTEMS**

2 Contact Hours | L | 2 | T | 1 | P | 0 |

3 Examination Duration (Hrs): | Theory | 0 | 3 | Practical | 0 | 0 |

4 Relative Weightage | M-I | 2 | 0 | M-II | 2 | 0 | Asm | 1 | 0 | ME | 5 | 0 | PRE | 0 | 0 |

5 Credits: | 0 | 3 | 5th Semester | √ Autumn | | Spring |

6 **Objective:**
The objective of the course is to make students understand the fundamentals of point to point communication link. It also provides design issues in a digital communication and different communication techniques.

7. **Details of the Course:**

S.No	Particulars	Contact Hours
1.	Spectral analysis of Signals: Fourier series of repetative signals, Fourier transform of non- repetative signals, amplitude spectrum of special signals viz. Pulse train and pulse waveform	08
2.	Modulation: AM, DSB/SC, SSB, VSB, Angle modulation, NBFM, WBFM, Diode detector, Frequency discriminator, AM & FM, Transmitter	10
3.	Demodulation: AM and FM signals, Radio Receivers – AM & FM, (Block diagram)	06
4.	Noise Analysis: Performance of AM & FM Systems, in presence of noise Threshold in AM & FM Demodulations, Pre- emphasis, and De-emphasis, in FM Systems	06
5.	Digital Communication: Sampling, Quantization, Quantization noise, Coding, Pulse code Modulation; Differential PCM, ADPCM, Relative advantages and dis-advantages. Delta modulation. PWM & PPM	08
6.	Digital Modulation Techniques: ESK, FSK, PSK, M-FSK, DPSK, GPSK schemes	04
	Total Contact Hours	42

8. **Suggested Books:**

S.No	Name of Book	Author	Publisher	Year of Publication
1	Electronics communication System	G. Kennedy	Mcgraw hill education (India) Ltd	2005
2	Principles of Communication system	Taub and Shelling	Tata Mcgraw hill education Pvt Ltd	2007
3	Communication system	S. Haykins	Willey India Pvt Ltd	2007

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **Electrical Engineering**

1 Subject Code **ECE-509** Course Title DIGITAL ELECTRONICS AND LOGIC DESIGN

2 Contact Hours | L | 3 | | T | 1 | | P | 2 |

3 Examination Duration (Hrs): | Theory | 0 | 3 | | Practical | 0 | 0 |

4 Relative Weightage | M-I | 2 | 0 | | M-II | 2 | 0 | | Asm | 1 | 0 | | ME | 5 | 0 | | PRE | 0 | 0 |

5 Credits: | 0 | 5 | 5th Semester | √ Autumn | | Spring |

6 **Objective:**
The objective of the course is to make students familiar with Digital controls and different components used in digital electronics. It provides the review of basic principles, without any prior knowledge of the topic.

7. **Details of the Course:**

S.No	Particulars	Contact Hours
1.	Review of Binary, octal and hexadecimal number systems. Various types of codes	06
2.	Boolean algebra and Boolean theorems.	04
3.	Logic gates and implementation of Boolean functions with various types of logic gates. Circuit equivalence	06
4.	Simplification techniques and minimization by map methods. Tabular method	06
5.	Combination logic and arithmetic circuits. Encoders and Decoders, multiplexes & de-multiplexes	04
6.	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	08
7.	Latches and memory organisation. ROM's, EPROM's and RAM's –Dynamic and static	04
8.	Introduction to PLA's	02
9.	IEEE notations	02
	Total Contact Hours	42

8. **Suggested Books:**

S.No	Name of Book	Author	Publisher	Year of Publication
1	Digital logic	M. Moris Mano	Pearson	1979
2	Digital principles and applications	A.P. Malvino	Tata Mcgraw hill	2006
3	Switching circuits	Marcus	Prentice hall	1976-02

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **Electrical Engineering**

1 Subject Code ECE-510P Course Title **DIGITAL ELECTRONICS AND LOGIC DESIGN LAB**

2 Contact Hours | L | 0 | T | 0 | P | 2 |

3 Examination Duration (Hrs): | Theory | 0 | 0 | Practical | 0 | 2 |

4 Relative Weightage | MSLE | 2 | 5 | ESLE | 2 | 5 |

5 Credits: | 0 | 1 | 3rd Semester | √ Autumn | | Spring |

6 **Objective:**
The objective of the lab is to make students familiar with the different digital devices used in digital electronics.

10. Lab. Experiments:

S.No	Experiments
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 Morgans 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
13	MINI PROJECT: Design and fabricate a frequency counter clock

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **Electrical Engineering**

1 Subject Code **MTH-503** Course Title **MATHEMATICS-V**

2 Contact Hours | L | 2 | | T | 1 | | P | 0 |

3 Examination Duration (Hrs): | Theory | 0 | 3 | | Practical | 0 | 0 |

4 Relative Weightage | M-I | 2 | 0 | | M-II | 2 | 0 | | Asm | 1 | 0 | | ME | 5 | 0 | | PRE | 0 | 0 |

5 Credits: | 0 | 3 | 5th Semester | √ Autumn | | Spring |

6 **Objective:**

The main theme of the course is to use Numerical Techniques in Electrical engineering problems.

7. **Details of the Course:**

S.No	Particulars	Contact Hours
1.	**Finite Difference:** Difference Table and its usage. The difference operators Δ, ▼ and the operator E	04
2.	**Interpolation:** Interpolation with equal intervals, Newton's advancing difference formula. Newtons's backward difference formula. Interpolation with unequal intervals. Newton's divided difference formula. Lagrange's interpolation formula	06
3.	**2. Central Differences:** The central difference operator δ and the overraging operator μ. Relations between the operators.Gauss forward and backward interpolation formula, Sterlings, Bessel's, Laplace and Everetts formulae	04
4.	**Numerical solution of algebraic and Transcendental Equations:** Graphic Method, Regula-Fast method, Balzano's Process of bisection of intervals, Newton-Raphson Method and its geometrical significance	06
5.	**Numerical Integration:** Numerical Integration, General Quadrature Formula, Simpson's one-third and three-eight rules, Weddles' rule, Hardy's rule, Trapezoidal rule.	06
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	06
7.	**Statistics and Probability:** Random experiment, sample space, events, Mutually exclusive events, Classical and Axiomatic approach (definition) of probability, Dependent and independent events. Addition and multiplication theorems on probability, Baye's theorem on conditional probability. Covariance, Correlation, coefficient of correlation,, lines of Regression, Method of least squares, fitting a straight line and parabola of second degree. Random variable, Moments and moment generating function of discrete and continuous random variables Additive and Multiplicative law of mathematical expectation	10
	Total Contact Hours	42

Books Suggested:

S.No	Name of Book	Author	Publisher	Year of Publication
1	Numerical Methods for Scientists and Engineering	M.K.Jain, S.R.Iyengar & R.K. Jain, Wiley Eastern Ltd	New age publishers	2005
2	Mathematical Numerical Analysis	S.C. Scarborough	CBS Publishers and distributors	
3	Introductry methods in Numerical Analysis	S.S.Sastry	PHI learning Pvt Ltd	2009
5	Numerical Methods for Mathematics, Sciences and Engg	J. H. Mathews	Prentice hall college division	2nd sub edition Jan 1992
6	Fundamentals of Mathematical Statistics	S.C.Gupta and V.K.Kapoor	S. chand	2011
7	Statistical Theory and Methodology in Science and Engineering	Brownlee	Krieger publishers co	2nd edition 1984
8	Introduction to Mathematical Statistics	R.E. Walpole 3rd edition	Prentice hall	3rd sub edition 1982