NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **Electrical Engineering**

1 **Subject Code** ELE-601 **Course Title** ***POWER SYSTEM -11***

2 **Contact Hours:** 42 | L | 3 | T | 1 | P | |

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

4 **Relative Weight age** | M-I | 2 | 0 | M-II | 2 | 0 | ASM | 1 | 0 | ME | 5 | 0 | PRE | 0 | 0 |

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

6 **Objective:**

7. **Details of the Course:**

S.No	Particulars	Contact Hours
1.	**Per Unit Representation of Power Systems:** Single line diagram, impedance and reactance diagram of a system, per unit calculations, per unit representation of a power system.	6
2.	**Fault Analysis (Balanced Faults**: Faults, types of faults, symmetrical 3-phase balanced faults – calculation of fault currents, current limiting reactors.	6
3.	**Fault Analysis (Un-symmetrical Faults)** Symmetrical components, sequence impedances, sequence networks, unsymmetrical faults –single line to ground, line-to-line, double line to ground faults on unloaded alternators and on power systems,	8
4.	**Insulation Co-ordination:** Generation of over-voltages in a power system, lightning phenomena, lightning surges, switching surges-interruption of short circuits and switching operations, switching surges – interruption of capacitive circuits, resonance over voltages, protection of power system components against over voltages – ground wires, lightning arrestors. Concept of insulation coordination, Basic impulse insulation level, standard impulse test wave, volt-time curve, location and rating of lightning arrestors.	8
5.	**Surge Performance of Transmission Lines:** Traveling waves on transmission lines, open-end line, short-circuited line, line terminated through a resistance, line connected to a cable, reflection and refraction at a T-junction, line terminated through a capacitance, line terminated through an inductance, Attenuation of traveling waves.	6
6.	**Interference of Power Lines with communication Circuit** Electrostatic and Electromagnetic effects. .	2
7.	**High Voltage Direct Current Transmission & FACTS Technology** Comparison of HVAC and HVDC transmission lines. Thyristors (brief revision). Basic converter and D.C system operation – rectification, inversion. Complete direction current link. Objective of FACTS. Basic types of FACTS controllers. Introduction to FACTS Devices.	6
	Total Contact Hours	42

8. **Suggested Books:**

S.No	Name of Book	Author	Publisher	Date of publishing
1	Power System Analysis	J.J. Grainger and W.D Stevenson	Tata McGraw Hill	1994
2	Electrical Power Systems.	C.L. Wadhwa	New age Publication	2005
3	Power Systems Engineering	Nagrath and Kothari	Tata McGraw hill	2007

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **Electrical Engineering**

1 Subject Code ELE-601P Course Title **POWER SYSTEM- II LAB**

2 **Contact Hours 02**

L	0	T	0	P	2

3 **Examination Duration (Hrs):**

Theory	0	0	Practical	0	2

4 **Relative Weight age**

MSLE	2	5	ESLE	2	5

5 **Credits:** 0 1 **Semester**

√	
Autumn	Spring

6 **Objective:**

7. Lab. Experiments:

S.No	Experiments
1	Per unit representation of a power system.
2	Measurement of positive, negative and zero sequence impedance and currents.
3	Measurement of earth resistance.
4	Measurement of insulation resistance of insulators
5	Transmission line fault analysis
6	Application of software packages in power systems.

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **Electrical Engineering**

1 **Subject Code** ELE-602 **Course Title** **POWER ELECTRONICS**

2 **Contact Hours:** 42 L 2 T 1 P

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

4 **Relative Weight age** M-I 2 0 M-II 2 0 ASM 1 0 ME 5 0 PRE 0 0

5 **Credits:** 0 4 **Semester** √ Autumn Spring

6 **Objective:**

7. **Details of the Course:**

S.No	Particulars	Contact Hours
1.	**Introduction of Power Electronics, Power Semi-conductor Devices:** Power Diodes, power Transistors, power MOSFETs, IGBTs, GTOs, Thyristors, Basic theory of operation, characteristics, Ratings, Protection and cooling, Recent Advances in Power Semi-conductor Devices.	8
2.	**Driving and control circuits:** series and parallel operation of devices, commutation of power switching devices.	4
3.	**Power Electronic converters**: 1-phase / 3 phase phase-controlled converters (Semi-converters, full – converters and Dual converters). Analysis and performance with passive load, Harmonics and power factor, PWM Rectifiers.	8
4.	**D.C-to-D.C converters (choppers) :**Buck, Boost and Buck-Boost type and various chopper configurations.	5
5.	**A.C voltage controllers.**	2
6.	**D.C –to-A.C converters (Inverters):** 1-phase / 3-phase, VSI, PWM VSI, CSI, Frequency and voltage control, Line-commutated inverters (LCIs).	6
7.	**Cyclo-converters (1-phase and 3-phase)**	3
8	**Power quality issues and present status of improved power quality converters (IPQCs).**	4
9.	**Some typical applications of power Electronics**	2
	Total Contact Hours	42

8. **Suggested Books:**

S.No	Name of Book	Author	Publisher	Date of publishing
1.	Power Electronics: Circuits, Devices and Applications	M. H. Rashid	Pearson education india	2003
2.	Power Electronics	C.W Lander.	McGraw-Hill	1994
3.	Power semi-conductor controlled Drives	G.K.Dubey	Prentice Hall	1989
4.	Thyristorized Power controllers	G.K. Dubey, Doradla, Joshi and Sinha	New age international publishers	1986
5.	Power Electronics and Variable Frequency Drives	B.K Bose	IEEE press	1997
6.	Modern power Electronics	B.K Bose	IEEE press	1992
7.	Power Electronic control of AC Motor	Murphy and Turnbull	Pergamon press	1988

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **Electrical Engineering**

1 **Subject Code** ELE-602P **Course Title** **POWER ELECTRONICS LAB**

2 **Contact Hours**

L	0	T	0	P	2

3 Examination Duration (Hrs):

Theory	0	0	Practical	0	2

4 **Relative Weight age**

MSLE	2	5	ESLE	2	5

5 **Credits:**

0	1

3rd Semester

√	
Autumn	Spring

6 **Objective:**

Lab. Experiments:

S.No	Experiments
1	To obtain the V-I static characteristics of an SCR,triac and diac,.
2	To study various triggering circuits
3	To obtain the UJT characteristics
4	To study the operation of a Line Synchronised UJT Relaxation Oscillator.
5	To study the illumination control using SCR.
6	To study the light operated SCR Alarm circuit.
7	To study half wave gate controlled rectifier using one SCR.
8	To study single phase half controlled,full wave rectifier.
9	To study various techniques of forced commutation of an SCR.
10	To study the DC circuit breaker action of an SCR.
11	To study the speed control of a DC shunt motor using single phase bridge converter.
‘12	To study the speed control of a single phase induction motor using single phase voltage controller.

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **Electrical Engineering**

1 **Subject Code** ELE-603 **Course Title** **Computer Aided Design of Electric Machines**

2 **Contact Hours**: 42

L	3	T	1	P	

3 **Examination Duration (Hrs)**:

Theory	0	3	Practical		

4 **Relative Weightage**

M-I	2	0	M-II	2	0	ASM	1	0	ME	5	0	PRE	0	0

5 **Credits:** 0 5 **Semester** √ Autumn / Spring

6 **Objective:**

7. **Details of the Course:**

S.No	Particulars	Contact Hours
1.	Principles of Electrical Machine Design: Considerations in design, design factors, limitations in design, modern trends in design.	6
2.	Magnetic Circuit Calculations Magnetization curves, Magnetic leakage, calculation of mmf for air gap and teeth, effect of saliency.	5
3.	Armature Winding Design. Winding design, Integrated approach for windings, A.C armature windings, production of emf in windings, Mmf distribution of armature windings, eddy current losses in conductors.	6
4.	Design of D.C Machines:: Output equation, Main dimensions, Armature design, Armature windings, Design of commutator and brushes, Design of Field systems, Design of interpoles.	7
5.	Design of single-phase and three-phase Transformers Output equation, core design, winding design, yoke design, Design of transformer tank with tubes, design of insulation.	7
6	Design of Induction Motors (1-phase and 3-phase) Output equation, main dimensions, Stator winding, stator conductors, shape of stator slots, number of stator slots, stator core, rotor design (squirrel cage and wound rotor)	7
7.	Design of Synchronous Machines: Main dimensions, length of air gap, stator	3
	Total Contact Hours	42

8. **Suggested Books:**

S.No	Name of Book	Author	Publisher	Date of publishing
1	Electric Machine Design	A.K. Sawhney	Dhanpat rai and sons	1996
2	Design of Electrical Machines	Mittle and Mittal	Standard publishers and distributers	1983
3	Electrical machine Design	R.K. Agarwal	S.S.Kataria and sons	2010

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **Electrical Engineering**

1 **Subject Code** ELE-603P **Course Title** **COMPUTER AIDED DESIGN OF ELECTRIC MACHINES LAB**

2 **Contact Hours: 02**

L	0	T	0	P	2

3 **Examination Duration (Hrs):**

Theory	0	0	Practical	0	2

4 **Relative Weight age**

MSLE	2	5	ESLE	2	5

5 **Credits:** 0 1 3rd Semester

√	
Autumn	Spring

6 **Objective:**

8. Lab. Experiments:

S.No	Experiments
1	Design of Single-phase Transformers.
2	Design of Three-phase Transformers.
3	Design of Autotransformers.
4	Design of Direct current Machines.
5	Design of Induction Machines.
6	Design of Synchronous Machines.

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **Electrical Engineering**

1 **Subject Code** ELE-605 **Course Title** ***DIGITAL SIGNAL PROCESSING***

2 **Contact Hours:** 42 L 3 T 1 P 0

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

4 **Relative Weight age** M-I 2 0 M-II 2 0 ASM 1 0 ME 5 0 PRE 0 0

5 **Credits:** 0 4 Semester √ Autumn Spring

6 **Objective:the objective of the course is to enhance the digital signal processing skills and technicalities of the students.**

7. **Details of the Course:**

S.No	Particulars	Contact Hours
1.	**Discrete Time Signals & Systems** Sequences, & sequence operations, Discrete-time systems. Linear Time – Invariant systems, impulse response, causality, stability. Frequency-Domain Representation of Discrete-Time signals and systems, Fourier Transforms, properties, theorems.	8
2.	**Sampling of Continuous – Time Signals.** Periodic sampling, frequency- domain representation of sampling, reconstruction of signals, discrete-time processing of continuos –time signals, continuous –time processing of Discrete-time signals, changing the sampling rate.	8
3.	**Transform Analysis of Linear time Invariant Systems.** Z- Transform, Region of Convergence, properties, Inverse Z-Transform, Frequency Response of LTI systems, system functions, linear constant coefficient, difference equations FIR and IIR systems, Frequency Response.	9
4.	**Structure of Discrete-Time Systems.** Block Diagram Representation of linear constant-coefficient Difference equations, signal flow graph representation. Basic structures for IIR systems, Transposed forms, Basic network structures for FIR systems.	8
5	**Filter Design Techniques.** Design of Discrete-Time IIR filters from continuous – Time filters. Impulse invariance, bilinear transformation. Butterworth Chebyshev,Eliptic Approximation, low pass, high pass, band-pass and Band-stop filters, design of FIR filters by windowing. Kaiser, Hamming, Hamming windows	9
	Total Contact Hours	42

8. **Suggested Books:**

S.No	Name of Book	Author	Publisher	Year of publication
1	Discrete Time Signal Processing.	A.V Oppenheim and R. W Schafer	Prentice hall international	1989
2	Digital Signal Processing Principles, Algorthims and Applications.	John G. Proakis and D.G Manolavis:	Prentice hall	1995
3	Introduction To Digital Signal Processing.	J.R Johnson	Prentice hall	1989
4	Theory and Application of Digital Signal Processing.	L.R Rabinder and B. Gold	Prentice hall	1975

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **Electrical Engineering**

1 **Subject Code** ELE-606 **Course Title** ***MICROPROCESSOR***

2 **Contact Hours:** 42 | L | 2 | T | 1 | P | |

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

4 **Relative Weight age** | M-I | 2 | 0 | M-II | 2 | 0 | ASM | 1 | 0 | ME | 5 | 0 | PRE | 0 | 0 |

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

6 **Objective:**

7. **Details of the Course:**

S.No	Particulars	Contact Hours
1.	**Overview of Microprocessor** Basic Terminology, evolution of Microprocessors, State of Art of μ P, why we study 8085 μ P	6
2.	**8085 «p Architecture:** Pin diagram, detailed internal architecture, state transition Diagrams, T-states (clock cycles), machine cycles, instruction cycles, instruction formats.	6
3.	**Instruction Set and Programming Techniques:** Different addressing modes, complete description of all instructions with macro and micro RTL (Register Transfer language), programming examples, simulation of time delays.	6
4.	**Interrupts:** Concept of interrupts, priority of interrupts signals, software generated interrupts and hardware generated interrupts.	6
5.	**Serial I/O:** Introduction with reference to 8085, general concepts.	4
6.	**Interfacing:** Concept of fold back addresses, memory maps, memory mapped I/O isolated I/o, interfacing of seven segment LED display, toggle switches, keyboard interfacing, memory interfacing, simplification of interfacing circuitry with the help of decoders, general purpose programmable peripheral devices, interfacing of A/D and D/A conversion devices.	8
7.	**Microprocessor Applications:** Some illustrative examples.	4
8.	**Introduction to 8086 Mp**	2
	Total Contact Hours	42

9. Suggested Books:

10.

S.No	Name of Book	Author	Publisher	Date of publishing
1	Microprocessor Architecture Programming and Applications with the 8085	Ramesh S. Gaonkar.	Prentice hall	2002
2	Microprocessors and Programmed Logic	K.L. Short	Prentice hall	1988
3	Microprocessors: Theory and Applications (Intel and Motorola)	M. Rafiquzzaman	Prentice hall	1992

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **Electrical Engineering**

1 **Subject Code** ELE-606P **Course Title** **MICROPROCESSOR LAB**

2 **Contact Hours**

L	0	T	0	P	2

3 **Examination Duration (Hrs):**

Theory	0	0	Practical	0	2

4 **Relative Weight age**

MSLE	2	5	ESLE	2	5

5 **Credits:** 0 1 3rd Semester

√	
Autumn	Spring

6 **Objective:**

11. Lab. Experiments:

S.No	Experiments
1	Microprocessors (8085) training kit and its working.
2	Programs related to data transfer between registers, between registers and memory.
3	Programs related to logic instructions.
4	Programming techniques with additional instructions. Looping, counting and indexing.
5	Programs related to Arithmetic Instructions, 8 bit and 16 bit Addition and Subtraction.
6	Copying Blocks of data from one part of memory to another, conditional copy.
7	Programs related to Counters and time delays
8	Programs related to use of stack and subroutines. Nesting.
9	Interfacing concepts. Switch and LED interfacing. Square wave generation.
10	ADC interfacing.

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **Electrical Engineering**

1 **Subject Code** ELE-607 **Course Title** ***POWER ELECTRONICS [ECE]***

2 **Contact Hours:** 42 L 2 T 1 P 2

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

4 Relative Weight age M-I 2 0 M-II 2 0 ASM 1 0 ME 5 0 PRE 0 0

5 **Credits:** 0 4 **Semester** √ Autumn Spring

6 **Objective:**

7. **Details of the Course:**

S.No	Particulars	Contact Hours
1.	**Introduction of Power Electronics, Power Semi-conductor Devices:** Power Diodes, power Transistors, power MOSFETs, IGBTs, GTOs, Thyristors, Basic theory of operation, characteristics, Ratings, Protection and cooling, Recent Advances in Power Semi-conductor Devices.	8
2.	**Driving and control circuits:** series and parallel operation of devices, commutation of power switching devices.	4
3.	**Power Electronic converters**: 1-phase / 3 phase phase-controlled converters (Semi-converters, full – converters and Dual converters). Analysis and performance with passive load, Harmonics and power factor, PWM Rectifiers.	8
4.	**D.C-to-D.C converters (choppers) :**Buck, Boost and Buck-Boost type and various chopper configurations.	5
5.	**A.C voltage controllers.**	2
6.	**D.C –to-A.C converters (Inverters):** 1-phase / 3-phase, VSI, PWM VSI, CSI, Frequency and voltage control, Line-commutated inverters (LCIs).	6
7.	**Cyclo-converters (1-phase and 3-phase)**	3
8.	**Power quality issues and present status of improved power quality converters (IPQCs).**	4
9.	**Some typical applications of power Electronics**	2
	Total Contact Hours	42

8. **Suggested Books:**

S.No	Name of Book	Author	Publisher	Date of publishing
1.	Power Electronics: Circuits, Devices and Applications	M. H. Rashid	Pearson education india	2003
3.	Power Electronics	C.W Lander.	McGraw-Hill	1994
4.	Power semi-conductor controlled Drives	G.K.Dubey	Prentice Hall	1989
5.	Thyristorized Power controllers	G.K. Dubey, Doradla, Joshi and Sinha	New age international publishers	1986
6.	Power Electronics and Variable Frequency Drives	B.K Bose	Wiley publication	1997
7.	Modern power Electronics	B.K Bose	Jaico publishers	1992
8.	Power Electronic control of AC Motor	Murphy and Turnbull	Pergamon press	1988

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **Electrical Engineering**

1 **Subject Code** ELE-607P **Course Title** **POWER ELECTRONICS LAB [ECE]**

2 **Contact Hours:02**

L	0	T	0	P	2

3 **Examination Duration (Hrs):**

Theory	0	0	Practical	0	2

4 **Relative Weight age**

MSLE	2	5	ESLE	2	5

5 **Credits:**

0	1

3rd Semester

√	
Autumn	Spring

6 **Objective:**

Lab. Experiments:

S.No	Experiments
1	To obtain the V-I static characteristics of an SCR,triac and diac,.
2	To study various triggering circuits
3	To obtain the UJT characteristics
4	To study the operation of a Line Synchronised UJT Relaxation Oscillator.
5	To study the illumination control using SCR.
6	To study the light operated SCR Alarm circuit.
7	To study half wave gate controlled rectifier using one SCR.
8	To study single phase half controlled,full wave rectifier.
9	To study various techniques of forced commutation of an SCR.
10	To study the DC circuit breaker action of an SCR.
11	To study the speed control of a DC shunt motor using single phase bridge converter.
'12	To study the speed control of a single phase induction motor using single phase voltage controller.