ELECTRICAL ENGINEERING DEPARTMENT

SEMESTER WISE COURSE STRUCTURE

B. Tech. 8th

S. No.	Course No.	TITLE / Subjects	ENGAGEMENT			C R E D I T S		
			L	T	P	TH	P	Total
1	ELE-801	Power Systems-III	2	1	0	3		03
2	ELE-1-16	**Elective-III MTH-705** (Optimization Techniques)	2	1	0	3		03
3	ELE-17-19	Elective-IV (High Voltage Engineering)	2	1	0	3		03
		Elective-IV Lab. (HVE Lab)	0	0	2		1	01
4	ELE-802	Project	0	0	18		12	12
5	ELE-803	Power Station Practice	2	1	0	3		03
Total Credits								25

L- Lecture T- Tutorial P- Practical TH- Theory

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **Electrical Engineering**

1 Subject Code **ELE-801** Course Title **Power Systems-III**

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

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

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

5 Credits: **0** **3** 8th Semester [ ] Autumn [√] Spring

6 **Objective:**

The course is introduced to the students to enable them to give optimal performance and to tackle every challenge during professional experience.

7. Details of the Course:

S.No	Particulars	Contact Hours
1.	Load Flows: Nature and importance of the problem, Network model formulation, algorithm for the formulation of Ybus matrix, formulation of Ybus by singular transformation, primitive network, Bus incidence matrix, load flow problem, load flow equations, bus classification – List of variables in load flow equations, Gauss - Seidel & Newton-Raphson method for solving load flow problem, comparison of load flow methods, De-coupled & Fast de-coupled power flow method, Modeling of tap-changing transformers and phase-shifters.	10
2.	Power System Stability: The stability problem, steady state, dynamic and transient stability, rotor dynamics and swing equation, power- angle curve, equal-area criterion of stability, Numerical solution of swing equation, Factors affecting transient stability.	08
3.	Automatic Generation Control: Real power balance and its effect on system frequency, load frequency control of single area system – Models of speed governing system, turbine and generator load, steady state analysis and dynamic response, proportional plus integral control, two area load frequency control, economic dispatch control.	08
4.	Control of voltage and Reactive Power: Generation and absorption of reactive power, Relation between voltage and reactive power, Need for voltage control at various system buses, Methods of voltage control – injection of reactive power, tap changing transformers, booster transformers, phase – shift transformers	08
5.	Economic Operation of Power System: Introduction, system constraints, economic dispatch neglecting losses, penalty factor, economic dispatch with losses, transmission loss equation, automatic load dispatching.	08
	Total Contact Hours	42

8. Suggested Books:

S.No	Name of Book	Author	Publisher	Year of Publ.
1	Power System Analysis	J.J. Grainger & W.D Stevenson	Tata McGraw-Hill	2007
2	Electrical Power Systems	B.M. Weedy and Cory	John Wiley & sons.	2001
3	Power Systems Engg.	Nagrath and Kothari	McGraw-Hill Education	2007
4	Electric Power Systems	C.L. Wadlhwa	New Age Publications	2010
5	Electric Energy System theory	O. I Elgard	McGraw-Hill	1982

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: Electrical Engineering

1 Subject Code ELE-18/E Course Title HIGH VOLTAGE ENGINEERING

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

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

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

5 Credits: 0 3 | 8th Semester: Autumn [ ] | Spring [√]

6 Objective:
The course is introduced to the students to enable them to give optimal performance and to tackle every challenge during professional experience.

7. Details of the Course:

S.No	Particulars	Contact Hours
1.	CONDUCTION AND BREAKDOWN IN GASES: Gases as insulators, ionization, current growth, Townsend's criterion for breakdown, electro-negative gases, Paschen's Law, Streamer breakdown mechanism, corona discharges, post breakdown phenomena, practical considerations in using gases for insulating materials.	08
2.	CONDUCTION AND BREAKDOWN IN LIQUID DIELECTRICS: Classification of liquid dielectrics, conduction and breakdown in pure liquids and in commercial liquids.	04
3.	BREAKDOWN IN SOLID DIELECTRICS: Intrinsic breakdown, electromechanical breakdown, thermal breakdown, breakdown of solid dielectrics in practice, breakdown of composite insulation, solid dielectric used in practice.	06
4.	APPLICATIONS OF INSULATING MATERIALS IN DIFFERENT ELECTRICAL APPARATUS. Applications in power transformers, rotating machines, circuit breakers, cables, power capacitors, electronic equipment.	03
5.	GENERATION OF HIGH VOLTAGES AND CURRENTS: Generation of high d.c. and a.c. voltages, generation of impulse voltages and currents.	08
6.	MEASUREMENT OF HIGH VOLTAGES AND CURRENTS: Measurement of high d.c. , a c. and impulse voltages, Measurement of high d.c, a.c and impulse currents.	06
7.	NON DESTRUCTIVE TESTING: Measurement of d.c. resistivity, dielectric constant and loss factor , partial discharge measurement.	04
8.	TESTING OF ELECTRICAL APPARATUS: Testing of insulators, bushings, isolators, circuit breakers, cables, transformers and surge diverters.	03
Total Contact Hours		42

8. Suggested Books:

S.No	Name of Book	Author	Publisher	Year of Pub.
1	High Voltage Engineering Fundamentals	E. Kuffel, W.S Zaengl	Newnes	2000
2	High Voltage Engineering	M.S. Naidu, V. Karamraju	Tata McGraw-Hill	2009
3	High voltage test techniques	Dieter kind, Kurt Feser.	Newnes	2001
4	An Introduction to High Voltage Engineering	Subir Ray.	Prentice Hall of India	2004

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **Electrical Engineering**

1 Subject Code ELE- **ELE-** Course Title **HIGH VOLTAGE ENGINEERING LABORATORY**

2	Contact Hours	L	**0**	T	**0**	P	**3**		
3	Examination Duration (Hrs):	Theory	**0**	**0**	Practical	**0**	**2**		
4	Relative Weight age	MSLE	**2**	**5**	ESLE	**2**	**5**		
5	Credits: **0** **1**	8th Semester		Autumn		√	Spring		

6 **Objective:**
The course is introduced to the students to enable them to give optimal performance and to tackle every challenge during professional experience.

7. Lab. Experiments:

S.No	Experiments
1	To test the breakdown voltage of insulating liquids according to specification ASTM D877.
2	To carry out one-minute power-frequency dry withstand and flashover test on 11 and 33 KV pin insulators.
3	To carry out one minute power-frequency dry withstand and flashover test on a string of three unit suspension type insulator.
4	To study the effect of front resistance, tail resistance, generator capacitance and the load capacitance on the impulse voltage wave shape.
5	Measurement of high voltages using sphere gaps.
6	To carry out impulse voltage withstand test on a pin insulator /string of insulators as per international specifications.
7	To find out the 50% impulse flashover voltage of a pin insulator / insulator string.
8	Study of breakdown characteristics of electrodes with different shapes under d.c., a.c., and impulse voltage conditions.

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: Electrical Engineering

1 Subject Code ELE-604 Course Title *POWER STATION PRACTICE*

2 Contact Hours: 42 | L | 2 | 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 | 3 | Semester | √ Autumn | | Spring |

6 Objective:

7. Details of the Course:

S.No	Particulars	Contact Hours
1.	<u>Economic Aspects and power factor improvement:</u> Economics of generation, factors affecting the cost of generation, reduction of costs by interconnection of stations, curves useful in system operation, choice of size and number of generating units. Power factor, disadvantages of low power factor, methods of improving power factor, location of power factor improvement apparatus, economics of power factor improvement.	6
2.	<u>Power Tariff:</u> Cost of generating station, fixed capital, running capital, annual cost, running charges, fixed charges, factors influencing the rate of tariff, designing tariff, different types of tariff, flat rate tariff, block rate tariff, two part tariff, maximum demand tariff, power factor tariff.	6
3.	<u>Neutral Grounding:</u> Neutral grounding, solid grounding, resistance grounding, reactance grounding, arc suppression coil grounding, earthing transformers, choice of methods of neutral grounding equipment, grounding for safety.	6
4.	<u>Overview of different types of power stations and their auxiliaries:</u> Thermal power plants, hydroelectric stations, nuclear power stations, diesel power stations, gas turbine plants.	5
5.	<u>Overview of substations and substation equipment:</u> <u>Illumination:</u> Principle of production of light, sources of light, filament lumps, halogen lamps, discharge lamps, sodium discharge lamps, mercury discharge lamp, dual lamp, flourscent lamps, planned maintenance of lighting installations, arc lamps, laws of illumination, various lamp fittings, design of lighting systems, street lighting, recent trends in lighting systems. <u>Electric Heating:</u> Advantages, various heating methods (resistance and dielectric heating)	3
6. 7	<u>Electric Traction:</u> Traction systems, choice of traction systems, tram ways, trolley bus, systems of track electrification, D.C system, single phase low frequency A.C system, three phase A.C system, composite system, traction mechanics, types of services, speed-time curves, tractive effort, power of traction motor, specific energy consumption, mechanics of train movement, power supply arrangements, overhead equipment, current collection systems, selection of traction motors. 1. Construction, Testing and Commissioning of overhead Distribution lines.	5 5 6
Total Contact Hours		42

8. Suggested Books:

S.No	Name of Book	Author	Publisher
1	Elements of Power Station	Deshpande	Prentice hall
2	The Art and Science of Utilisation of Electric Energy	H. Pratab	Dhanpat Rai And Sons
3	Substation Design and Equipment	Satnam	Dhanpat Rai And Sons
4	A Course in Electrical Power	Soni, Gupta and Batnagar	Dhanpat Rai And Sons