DEPARTMENT OF ELECTRICAL ENGIEERING
INDUS INSTITUTE OF TECHNOLOGY & ENGINEERING
INDUS UNIVERSITY

B-TECH ELECTRICAL ENGINEERING, SEMESTER –III TEACHING & EXAMINATION SCHEME WITH EFFECT FROM JULY 2017

SR NO	CODE	SUBJECTS	TEACHING SCHEME			CREDITS	HOURS	EXAMINATION SCHEME					
								THEORY			PRACT		TOTAL
								CIE					
			L	T	P			MID	IE	ESE	CIE	ESE	
1	SH0301	Differential equations & integral transform	3	2	0	4	5	30	10	60	00	00	100
2	EL0301	Network Analysis	3	2	0	4	5	30	10	60	00	00	100
3	EL0302	Power Generation	3	2	0	4	5	30	10	60	00	00	100
4	EL0303	Electronics Devices & Circuit	3	0	2	4	5	30	10	60	40	60	200
5	EC0301	Digital Logic Design	3	0	2	4	5	30	10	60	40	60	200
6	EL0304	Electrical Machines-I	3	2	2	5	7	30	10	60	40	60	200
7	SH0307	Human Values and Professional Ethics	1	0	0	0	1	30	10	60	00	00	100
TOTAL			**19**	**08**	**06**	**25**	**33**	**210**	**70**	**420**	**80**	**120**	**900**

Approved Vide Agenda Item No. 03 of Minutes of Meeting of Academic Council held on 11 July 17

DEPARTMENT OF ELECTRICAL ENGIEERING
INDUS INSTITUTE OF TECHNOLOGY & ENGINEERING
INDUS UNIVERSITY

B-TECH ELECTRICAL ENGINEERING, SEMESTER –IV TEACHING & EXAMINATION SCHEME WITH EFFECT FROM JULY 2017

SR NO	CODE	SUBJECTS	TEACHING SCHEME			CREDITS	HOURS	EXAMINATION SCHEME					
								THEORY			PRACT		TOTAL
								CIE					
			L	T	P			MID	IE	ESE	CIE	ESE	
1	SH0401	Complex Analysis and numerical methods	3	2	0	4	5	30	10	60	00	00	100
2	EC0404	Electromagnetic	3	2	0	4	5	30	10	60	00	00	100
3	EL0401	Power System I	3	2	0	4	5	30	10	60	00	00	100
4	EL0402	Electrical Machines-II	4	0	2	5	6	30	10	60	40	60	200
5	EL0403	Control theory	3	2	0	4	5	30	10	60	00	00	100
6	EL0404	Electrical Measurements	3	0	2	4	5	30	10	60	40	60	200
7	CE0407	Cyber Security and Intellectual Property Right	1	0	0	0	1	30	10	60	00	00	100
TOTAL			**20**	**8**	**4**	**25**	**32**	**210**	**70**	**420**	**80**	**120**	900

Approved Vide Agenda Item No. 03 of Minutes of Meeting of Academic Council held on 11 July 17

DEPARTMENT OF ELECTRICAL ENGIEERING
INDUS INSTITUTE OF TECHNOLOGY & ENGINEERING
INDUS UNIVERSITY

B-TECH ELECTRICAL ENGINEERING, SEMESTER –V TEACHING & EXAMINATION SCHEME WITH EFFECT FROM JULY 2017													
SR NO	CODE	SUBJECTS	TEACHING SCHEME			CREDITS	HOURS	EXAMINATION SCHEME					
								THEORY			PRACT		TOTAL
								CIE					
			L	T	P			MID	IE	ESE	CIE	ESE	
1	EL0501	Power Electronics	3	0	2	4	5	30	10	60	40	60	200
2	EL0502	Microprocessor & Microcontroller Interfacing	3	0	2	4	5	30	10	60	40	60	200
3	EL0503	Electrical Design	3	2	0	4	5	30	10	60	00	00	100
4	EL0504	Industrial Instrumentation	3	0	2	4	5	30	10	60	40	60	200
5	EL0505	Power System-II	4	0	2	5	6	30	10	60	40	60	200
6	EL0506	Electrical Power Utilization & Traction	3	2	0	4	5	30	10	60	00	00	100
7	SH0507	Technical Communication and Soft Skills	1	0	0	0	1	30	10	60	00	00	100
TOTAL			**20**	**04**	**8**	**25**	**32**	**210**	**70**	**420**	**200**	**300**	**1200**

Approved Vide Agenda Item No. 03 of Minutes of Meeting of Academic Council held on 11 July 17

DEPARTMENT OF ELECTRICAL ENGIEERING
INDUS INSTITUTE OF TECHNOLOGY & ENGINEERING
INDUS UNIVERSITY

B-TECH ELECTRICAL ENGINEERING, SEMESTER –VI TEACHING & EXAMINATION SCHEME WITH EFFECT FROM JULY 2017

SR NO	CODE	SUBJECTS	TEACHING SCHEME			CREDITS	HOURS	EXAMINATION SCHEME					
								THEORY			PRACT		TOTAL
								CIE					
			L	T	P			MID	IE	ESE	CIE	ESE	
1	EL0601	High Voltage Engineering	3	0	2	4	5	30	10	60	40	60	200
2	EL0602	Switchgear & Protection	4	0	2	5	6	30	10	60	40	60	200
3	EL0603	Electrical Drives & Control	3	0	2	4	5	30	10	60	40	60	200
4	EL0604	Electrical Machine Design I	3	2	0	4	5	30	10	60	00	00	100
5	EL0605	Advanced Control Theory (EL-I)	3	2	0	4	4	30	10	60	0	00	100
	EL0606	Industrial Automation (EL-I)											
	EL0607	Soft Computing Technique (EL-I)											
6	EL0608	Electrical Power Quality (EL-II)	3	2	0	4	5	30	10	60	00	00	100
	EL0609	EHV AC & DC (EL-II)											
	EL0610	Special machines (EL-II)											
	EL0611	MOOC Course (EL-II)											
7	SH0607	Advanced Technical Communication and Soft Skills	1	0	0	0	1	30	10	60	00	00	100
TOTAL			**21**	**04**	**06**	**25**	**31**	**210**	**70**	**420**	**80**	**120**	**900**

Approved Vide Agenda Item No. 03 of Minutes of Meeting of Academic Council held on 11 July 17

DEPARTMENT OF ELECTRICAL ENGIEERING
INDUS INSTITUTE OF TECHNOLOGY & ENGINEERING
INDUS UNIVERSITY

B-TECH ELECTRICAL ENGINEERING, SEMESTER –VII TEACHING & EXAMINATION SCHEME WITH EFFECT FROM JULY 2017

SR NO	CODE	SUBJECTS	TEACHING SCHEME			CREDITS	HOURS	EXAMINATION SCHEME					
								THEORY			PRACT		TOTAL
								CIE					
			L	T	P			MID	IE	ESE	CIE	ESE	
1	EL0701	Power System Design	3	0	2	4	5	30	10	60	40	60	200
2	EL0702	Power System Operation & Control	3	2	2	5	7	30	10	60	40	60	200
3	EL0703	Electrical Machine Design II	3	2	0	4	5	30	10	60	00	00	100
4	EL0704	Testing & Commissioning of Electrical Equipment	3	0	2	4	5	30	10	60	40	60	200
5	EL0705	Energy Management & Audit	3	2	0	4	5	30	10	60	00	00	100
6	EL0706	Flexible AC Transmission System (EL-III)	3	2	0	4	5	30	10	60	00	00	100
	EL0707	Advanced Power Electronics & Applications (EL-III)											
	EL0708	Power System Planning (EL-III)											
	EL0709	MOOC Course (EL-III)											
7	CV0712	Disaster Management	01	00	00	00	01	30	10	60	00	00	100
TOTAL			**19**	**08**	**06**	**25**	**33**	**210**	**70**	**420**	**120**	**180**	**1000**

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DEPARTMENT OF ELECTRICAL ENGIEERING
INDUS INSTITUTE OF TECHNOLOGY & ENGINEERING
INDUS UNIVERSITY

B-TECH ELECTRICAL ENGINEERING, SEMESTER –VIII TEACHING & EXAMINATION SCHEME WITH EFFECT FROM JULY 2017														
SR NO	CODE	SUBJECTS	TEACHING SCHEME			CREDITS	HOURS	EXAMINATION SCHEME						
								THEORY			PRACT		TOTAL
								CIE					
			L	T	P			MID	IE	ESE	CIE	ESE	
1	EL0801	Project	00	00	40	20	40	00	00	00	40	60	100
TOTAL			**00**	**00**	**40**	**20**	**40**	00	00	00	40	60	100

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3RD SEMESTER

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B-TECH ELECTRICAL ENGINEERING, SEMESTER –III TEACHING & EXAMINATION SCHEME WITH EFFECT FROM JULY 2017														
SR NO	CODE	SUBJECTS	TEACHING SCHEME			CREDITS	HOURS	EXAMINATION SCHEME						
								THEORY			PRACT		TOTAL
								CIE		ESE	CIE	ESE	
			L	T	P			MID	IE				
1	SH0301	Differential equations & integral transform	3	2	0	4	5	30	10	60	00	00	100
2	EL0301	Network Analysis	3	2	0	4	5	30	10	60	00	00	100
3	EL0302	Power Generation	3	2	0	4	5	30	10	60	00	00	100
4	EL0303	Electronics Devices & Circuit	3	0	2	4	5	30	10	60	40	60	200
5	EC0301	Digital Logic Design	3	0	2	4	5	30	10	60	40	60	200
6	EL0304	Electrical Machines-I	3	2	2	5	7	30	10	60	40	60	200
7	SH0307	Human Values and Professional Ethics	1	0	0	0	1	30	10	60	00	00	100
TOTAL			**19**	**08**	**06**	**25**	**33**	**210**	**70**	**420**	**80**	**120**	**900**

Approved Vide Agenda Item No. 03 of Minutes of Meeting of Academic Council held on 11 July 17

Subject: **Differential Equations and Integral Transforms**								
Program: **B.Tech. Electrical Engineering**			Subject Code:SH0301				Semester: **III**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	2	0	4	60	00	40	00	100

1. Course Outcomes:

- To provide an ability to see differential equations as a rigorous way of modelling physical phenomena.
- To provide an ability to derive major differential equations from physical principles.
- To provide an ability to understand the role of initial and boundary conditions in determining the solutions of equations.
- To provide an ability to choose and apply appropriate methods for solving differential equations.
- To provide an ability to undertake problem identification, formulation and solution.
- To provide an ability to calculate Laplace transforms and inverse Laplace transforms and uses them to solve differential equations (Initial value problems, Boundary value problems).
- To provide an ability to understand various concepts of Control System -Theory using Laplace Transform.

2. Contents:

UNIT-I **[12 Hours]**

Ordinary Differential Equations with applications: Revision of ordinary differential equation: Introduction of Mathematical Modeling, Basic Definitions, First Order First Degree Differential Equations, Variable Separable equation, Homogeneous Equation, Exact Differential Equations, Reduction of Non-exact Differential Equations to exact form using Integrating Factors, First Order Linear Differential Equation, Bernoulli Equation, Applications: Orthogonal Trajectories, Simple Electric Circuits, Solution of Linear differential equations of higher order with constant coefficients, complimentary function and particular integral.

UNIT-II **[12 Hours]**

Ordinary and Partial Differential Equations with applications: Method of variation of parameters, Method of Undetermined coefficients, Linear differential equations with variable coefficients (Cauchy's and Legendre forms), Simultaneous linear differential equations, Bessel and Legendre functions, Application of Linear differential equation - Application ofDeflection of Beams, Electric circuits, Series Solution of Ordinary Differential Equations – Power series method, Formation of Partial differential equations, Directly Integrable equations, Method of separation of variables, solution of one dimensional wave equation, heat equation and Laplace equation.

UNIT-III **[12 Hours]**

Laplace transforms: Relation between Laplace and Fourier Transform, Definition, Linearity property, Laplace transforms of elementary functions, Shifting theorem, Inverse Laplace transforms, Laplace transforms of derivatives and integrals, Convolution theorem, Application of Laplace transform in solving ordinary differential equations, Laplace transforms of periodic, Unit step and impulse functions.

UNIT-IV **[12 Hours]**

Fourier series, Fourier Integrals, Fourier Transforms and Z-Transforms: Fourier series, Drichlet's conditions, Euler's formula, Fourier expansion of periodic functions, Fourier series of even and odd functions, Half range Fourier series, Fourier integral theorem (only statement), Fourier sine and cosine integrals, Complex form of Fourier integral, Fourier transforms, Fourier sine and cosine transforms, Introduction to Z-transforms:Definition and Standard Z-transforms, Linearity Property, dumping Rule and some standard results, Some useful Z-transforms.

3. Text books:

1. Erwin Kreyszig: Advanced Engineering Mathematics (8th Ed.) , Wiley Eastern Ltd., New Delhi.

4. Reference Books:

1) B. V. Ramana: Higher Engineering Mathematics, Mc Graw Hill, New Delhi.
2) Dr. B.S. Growl: Higher Engineering Mathematics, Khanna Publishers, New Delhi.
3) R K Jain, S R K Iyengar: Advanced Engineering Mathematics. Third Edition, Narosa Publishing House
4) Merel C Potter, J L Goldberg: Advanced Engineering Mathematics (3rd Ed.), Oxford India Publication.
5) Murray Spiegel: Advanced Mathematics for Engineering & Science: (Schaum's Outline Series),Tata – McGraw Hill Publication

5. Digital resources

http://freevideolectures.com/blog/2010/11/130-nptel-iit-online-courses/

http://nptel.ac.in/video.php?subjectId=122107036
http://ocw.mit.edu/index.htm
https://www.khanacademy.org/

Subject: **Network Analysis**								
Program: **B.Tech. Electrical Engineering**				Subject Code: EL0301			Semester: **III**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	2	0	4	24/60	0	16/40	0	100

Course Outcome:

- Learn the different theorem to solve the network.
- Analysis the circuit containing dependent and independent sources.
- Time domain response of linear circuit.
- Laplace transforms analysis and Circuit application.
- Also learn two port networks.

SYLLABUS

UNIT-I **[12]**

Network Theorems

Thevenin ' s, Norton ' s, superposition and maximum power transfer theorem Compensation, reciprocity and Tellegen's theorems, Millman Theorem Duality Theorem., Substitution Theorem.(With AC source & dependent source).

UNIT-II **[12]**

Network Topology

Concept of network graphs, tree, link, cut set, network matrices, node incidence matrix, loop incidence matrix, cut set incidence matrix, network analysis using network incidence matrices and tie set matrix.

Transient Network Analysis

Initial conditions in inductor and capacitor. Geometrical interpretation of derivatives and procedure for evaluating initial conditions. Response of RL RC and RLC networks using Laplace Transforms for unit step, impulse and ramp inputs.

UNIT-III **[09]**

Laplace Transformation

Laplace transform fundamentals, properties and theorems, unit step function, other unit functions, the impulse ramp and doublet, Laplace transforms for shifted singular functions, initial and final value theorems Convolution integral.

Network Functions

Terminal pairs, network function for one port and two port network, ladder network and non ladder network. Concept of poles & zeros of network functions, Restriction on Pole and Zero locations of network function.

UNIT-IV **[12]**

Two Port Networks and their Characterization

Open circuit, short circuit, Z-parameter, hybrid, inverse hybrid and transmission parameters Series, parallel and tandem connections of two-port networks, multi-port networks, multi-terminal networks; Indefinite admittance matrix and its properties

Introduction to Computer Aided Network Analysis

Analysis of linear and nonlinear networks, concept of companion network model;, Computer aided transient network analysis.

Text Books

1. Network Analysis, M E Van Valkenburg, PHI
2. Circuit Theory- Analysis and Synthesis, A Chakrabarti, DhanpatRai Publications

Reference Book

3. Electric Circuits and Networks :- By K. S. Suresh Kumar – Pearson Education
4. Linear Circuits Analysis 2nd edition :-By DeCarlo/ Lin – Oxford University Press (Indian edition)
5. Engineering Circuit Analysis : - By W H Hayt, J E Kemmerly, S M Durbin 6th Edition TMH Publication
6. Network Analysis & Synthesis By Franklin S. KUO, Wiley Publication

Web Resource

1. www.nptel.ac.in
2. www.youtube.com

Subject: **Power Generation**								
Program: **B.Tech. Electrical Engineering**				Subject Code: EL0302				Semester: **III**
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	2	0	4	24/60	0	16/40	0	100

Course Outcome:

- Learn the various generating stations schematic diagram and working.
- Learn the different Power Plant, efficiency, environmental aspects etc.
- Also know the non conventional sources and combination of power plant.

SYLLABUS

UNIT-I **[10]**

Steam Power Station

Main flow circuits of thermal power station, thermodynamic cycles of steam flow, general layout of power stations, power station auxiliaries, cooling system of alternators, flue gas flow arrangement, circulating water system, cooling tower.

Hydroelectric Power Plant

Selection of site, water power equations, types of dams, arrangement and l layouts of hydroelectric station, classification of plants, water turbines, properties of water wheels, specific speed on the basis of discharge, combined steam and hydro plants, pumped storage hydro station.

UNIT-II **[12]**

Nuclear Power Station

Atomic structure, isotopes, energy release by fission, chain reaction, atomic reactor, fuels, moderators and coolants, types of reactors, fast breeder reactor, radioactivity, and hazards

Diesel and Gas Turbine Station

Field of use, general layout and principle of operation.

UNIT-III **[10]**

Non Conventional Method of Power Generation

MHD generation, WECS principle, wind mill classification, wind power, tidal power, solar power, solar collectors, flat plate collector and concentric collector, solar applications, solar cell, and fuel cell

UNIT-IV **[13]**

Combinations of Different Types of Power Plants

Types of power station, advantages of combined working of different types of power station, need for coordination of different types of power station, run-off river plant in combination with steam plant, hydro-electric plants with ample storage in combination with steam plants, pumped storage plant in combination with ordinary hydro-electric plant, co-ordination of hydro-electric and gas turbine plant, co-ordination of hydro-electric and nuclear power station, co-ordination of different types of power plants in power station.

Text Books

1. Arogyaswamy, "Power Station Practice", Oxford & IBM Pbs Co., New Delhi.
2. Dr. B.R.Gupta "Generation of Electrical Energy" S.Chand, New Delhi

Reference Book

3. Baptidanov L., "Power Station & Substation",Moscow Peace Pbs
4. Leznov S. & Taits, "Power Station & Substation Maintenance", Moscow Mir Pbs, 1983.
5. Leznov S. & Taits, "Power Station Electrification", Moscow Mir Pbs, 1983
6. Bruce, John, London, "Power Station Efficiency Control", Sir Issac Pitman & Sons Ltd., 1926.
7. Skrotzki B. G. A., Vopat W. A., "Power Station Engineering & Economy", New Delhi TataMc Graw Hill Pbs. Co. 1960.

Web Resource

1. **www.nptel.ac.in**
2. **www.youtube.com**

Subject: **Electronics Devices & Circuit**								
Program: **B.Tech. Electrical Engineering**				Subject Code: EL0303			Semester: **III**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	0	2	4	24/60	24/60	16/40	24/60	200

Course Outcome:

- To make the students aware about the analog devices characteristics and its various applications in the field of Electrical and Electronics Engineering.
- Learn Transistor, FET and BJT.
- Also they learn OPAMP and its application in this subject.

Subject Contents

Unit – 1 **[06]**

Transistor Biasing and Thermal Stabilization:

Review of operating Point, Bias Stability, Self-Bias, Stabilization against Variations in ICO, VBE and beta, General Remarks on Collector-Current Stability, Bias Compensation, Thermistor and Sensistor Compensation, Thermal Runaway, Thermal Stability.

Unit – 2 **[14]**

Transistor at Low Frequencies:

Graphical Analysis of the CE configuration, Two-Port Devices and the Hybrid Model, Transistor Hybrid Model, h-Parameters, Conversion Formulas for the Parameters of Three Transistor Configurations, Analysis of a Transistor Amplifier Circuit Using h Parameters, Emitter Follower, Comparison of Transistor Amplifier Configurations, Linear Analysis of a Transistor Circuit, Miller's Theorem and its Dual, Cascading Transistor Amplifiers, Simplified CE Hybrid Model, Simplified Calculations for the CC Configuration, CE Amplifier with an Emitter Resistance.

Unit – 3 **[11]**

Power Amplifier:

Class A large Signal Amplifiers, Second Harmonic Distortion, Higher –Order Harmonic Generation, Transformer Coupled Audio Power Amplifier, Efficiency, Push-Pull Amplifiers, Class B Amplifiers, Class AB Operation.

Field Effect Transistors:

Junction FET, Pinch-Off Voltage, JFET Volt-Ampere Characteristics, FET Small-Signal Model, MOSFET, Low Frequency CS and CD Amplifiers, Biasing the FET, the FET as a Voltage Variable Resistor.

Unit – 4 **[14]**

OPAMP:

Differential amplifier, open and closed loop gain of OPAMP, Op amp Parameters, slew rate, offset voltage, offset balancing technique, etc., inverting amplifier, non-inverting amplifier, frequency response, frequency compensation techniques

OPAMP Applications:

OPAMP as adder, subtractor, integrator, differentiator, voltage follower, constant voltage source, constant current source, comparator, zero crossing detector, Schmittz' trigger, Multivibrators Based on 555, Design of regulated power supplies.

Text Books:

1. Electronics Devices and circuits by Millman and Halkias
2. Electronics Device and Circuit Theory by Robert L. boylestad and Louis Nashelsky, Pearson Education.
3. OP-AMPs and Linear Integrated Circuits by Ramakant A. Gayakwad, Prentice Hall.

Reference Books:

1. Sergio Franco, "Design with Operational Amplifiers and Analog Integrated Circuits", Tata McGraw-Hill 2009 Edition.
2. Salivahanan, S., "Linear Integrated Circuits", Tata McGraw-Hill, 2008.

Web Resource

1. www.nptel.ac.in
2. www.youtube.com

Laboratory Experiment List

1. To Design voltage divider biasing circuit for a given transistor
2. To Plot frequency response of CE amplifier.
3. To plot the characteristics of FET.
4. To study distortion of Push-Pull amplifier.
5. To verify OPAMP Characteristics.
6. To perform Inverting and Non inverting amplifier.
7. To Perform OPAMP as a Comparator.
8. To perform zero crossing detector using OPAMP.
9. To perform OPAMP as adder and Subtractor.
10. To verify multivibrator using OPAMP.
11. Design Regulated power supply

Subject: **Digital Logic Design**								
Program: **B.Tech. Electrical Engineering**				Subject Code: EC0301			Semester: **III**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	0	2	4	24/60	24/60	16/40	16/40	200

Course Outcome:

- Get familiar with digital World. Learn the Number System, Boolean algebra.
- Combinational and Sequential Circuits.
- Develop the logical skill from this subject.

SYLLABUS

UNIT-I **[HRS]**

Binary Numbers

Introduction to Digital and Analog System, Octal, Decimal and Hexadecimal Numbering Systems,Binary Numbering System, Binary Conversion, Binary Operation, Gray Code, BCD code, Excess Three code

Boolean Algebra

Axioms and Laws of Boolean Algebra De Morgan's Theorem, Duality and Dual Simplification of Boolean Algebra using K-map and Tabulation method

UNIT-II **[HRS]**

Logic Gates

Basic Gates: AND, OR, NOT, Universal gates: NAND, NOR, X-OR, X-NOR and BUFFER ,Logic Operations, NAND and NOR implementation, Sum of product and product of sum representation

Logic Families

Introduction, Noise Margins, Fan-in and Fan-out, RTL and DTL logic, Integrated-Injection Logic Emitter-Coupled Logic, Complementary MOS

UNIT-III **[HRS]**

Combinational Logic

Introduction, Code Conversion, Multilevel NAND and NOR circuit, Various types of Adders and Subtractors, Magnitude Comparator, Decoders, Multiplexers, Programmable Logic Array

Sequential Logic

Introduction, Flip-Flops, Triggering of Flip-Flops, Conversion of Flip-Flops.

UNIT-IV **[HRS]**

FSM, Counter and Shifters Design

FSM Design, Ripple Counter(Asynchronous Counter), Synchronous Counter, Serial-in, Serial-out Shift Register, Parallel-in, Serial -out Shift Register, Serial-in, Parallel-out Shift Register, Parallel-in, Parallel-out Shift Register, Universal Shift Register.

Text Books

1. Morris Mano, "*Digital Logic and Computer Design*", Pearson.

Reference Book

1. Ronald J. Tocci, Gregory L. Moss, "*Digital Systems*", 10 Ed, Pearson
2. D.C.Green, "*Digital Electronics*"5th Ed., Pearson, 2005

Web Resource

1. www.nptel.ac.in
2. www.youtube.com
3. www.smartzworld.com/notes/digital-logic-design-dld/

Laboratory Experiment List

1. Verification of various types of logic gates and its truth table.
2. Verification of DeMorgan's Theorems.
3. Verification of NAND and NOR gates as universal gates.
4. Design of half adder and full adder and verification of their truth table.
5. Design of Half Subtractor and Full Subtractor and verification of their truth table.
6. Verification of different Types of Flip-Flops And Their Truth Table.
7. Design Logic Circuit for Conversion of BCD to Seven Segment Number.
8. Design Logic Circuit for 8 X 1 multiplexer and 1 X 8 demultiplexer.
9. Design Logic Circuit for Shift register.
10. Design Logic Circuit for Counter.
11. Design Logic Circuit for 4 bit Binary-to-Gray Code Converter.

Subject: **Electrical Machine-I**								
Program: **B.Tech. Electrical Engineering**				Subject Code: EL0304			Semester: **III**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	2	2	5	24/60	24/60	16/40	16/40	200

Course Outcome:

- Learn the D.C. Machines construction, working principle and performance.
- Also Learn the single Phase and poly phase transformer types, operation and constructions.

SYLLABUS

UNIT-I **[12]**

Principle of Electromechanical Energy Conversion

Energy stored in electric and magnetic fields, energy conversion in singly and multiply excited systems and torque production, reluctance torque; Reluctance and hysteresis motors.

General Description of Electrical Machines

Constructional details of dc and ac machines, description of magnetic and electric circuits in cylindrical rotor and salient pole machine, mmf distribution of current carrying single and multiple coils; Armature winding as a current sheet, associated mmf and flux density waves; Harmonics analysis of induced voltage; Torque as a function of flux and mmf.

UNIT-II **[09]**

DC Machines

Simplex lap and wave windings, emf and torque equations, interaction of the fields produced by excitation circuit and armature.

Commutation

Causes of bad commutation, methods of improving commutation, effects of brush shifts; Compensating winding. Interpol winding.

UNIT-III **[10]**

DC Generators

Methods of excitation, shunt, series and compound generators characteristics, testing.

DC Motors

Methods of excitation, characteristics, starting methods, effects of armature and field resistances.

Efficiency and Losses

Different losses in dc machines and their estimation.

UNIT-IV **[14]**

Single-phase Transformers

Construction, working principle, operation of ideal and practical transformer, under load and no-load condition for resistive, inductive and capacitive load. O/C and S/C test, derivation of transformer parameter, separation of losses, condition of maximum efficiency, voltage regulation, % impedance, equivalent circuit, Parallel operation.

Three-phase Transformers

Various connections and their comparative features, harmonics in emf and magnetizing current, effect of connections and construction on harmonics; Parallel operation of three-phase transformers, sharing of load, Various types of transformer construction as per the type of insulations.

Phase Conversion

3-phase to 2-phase conversion, 3-phase to 6- phases conversion.

Autotransformers

Principle of operation and comparison with two winding transformer voltage and current ratios, phasor diagram and equivalent circuit.

Text Books

1. Fitzgeraid A. E., Kingsley C. and Kusko A., "Electric Machinery", 6th Ed., McGraw-Hill International Book Company. 2008

2. Say M. G., "The Performance and Design of Alternating Current Machines", CBS Publishers and Distributors. 2005

Reference Book

1. Say M. G. and Taylor E. O., "Direct Current Machines", 3rd Ed.,ELBS and Pitman. 1986.
2. Nagrath I. J. and Kothari D. P., "Electrical Machines", 3rd Ed., Tata McGraw-Hill Publishing Company Limited. 2008.
3. Clayton A. E. and Hancock N., "The Performance and Design of DC Machines", CBS Publishers and Distributors. 2003
4. Langsdorf A. S., "Theory of AC Machines", 2nd Ed., Tata McGraw-Hill Publishing Company Limited. 2008

Web Resource

1. nptel.ac.in/courses/108105017/
2. www.youtube.com
3. https://ocw.mit.edu/courses/electrical-engineering

Laboratory Experiment List

1. To Perform Transformer Ratio Test & Polarity test of Single Phase Transformer
2. To Perform Open Circuit & Short Circuit test of Single Phase Transformer.
3. To Perform Direct Load Test on Single Phase Transformer
4. To Perform Parallel Operation of Single Phase Transformer
5. To Study of Different Connection of 3 Phase Transformer
6. To Perform Open Circuit & Short Circuit test On Three Phase Transformer
7. To Perform Direct Load test of 3- Phase transformer
8. To Study D.C. Machines Component & D.C. Starter.
9. To Perform Open Circuit characteristics & Load Characteristic of a D.C. Shunt Generator
10. To Perform Load test on a D.C. Series Generator to obtain its characteristics
11. To Perform Speed Control of D.C. Shunt Motor
12. To Perform Speed Control of D.C. Series Motor
13. To predetermine the efficiency of a DC shunt machine by conducting the Swinburne's Test.

1. as a motor 2. as a generator

14. To Conduct the Hopkinson's test on the pair of DC machines

Subject: **Human values & professional Ethics**								
Program: **B.Tech. Electrical Engineering**				Subject Code: SH0307			Semester: **III**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
1	0	0	0	60	00	40	00	100

Course Objectives:

1. To create an awareness on Engineering Ethics and Human Values.
2. To understand social responsibility of an engineer.
3. To appreciate ethical dilemma while discharging duties in professional life.

Contents:

Unit 1: Values and Self Development **04 hours**

Social Values and individual Attitudes, Work ethics, Indian vision of Humanism, Moral and non moral valuation, Standards and principles, Value judgments. Importance of cultivation of values, Sense of duty, Devotion, Self reliance, Confidence, Concentration, Truthfulness, Cleanliness, Honesty, Humanity, Power of faith, National unity, Patriotism, Love for nature, Discipline.

Unit 2: Personality and Behavior Development **04 hours**

Soul and scientific attitude. Goad and scientific attitude, positive thinking, integrity and discipline, punctuality, love and kindness. Avoiding fault, finding. Free from anger, Dignity of labor, Universal brotherhood and religious tolerance, True friendship, Happiness vs. suffering love for truth. Aware of self destructive habits, Association and cooperation, doing best, saving nature.

Unit 3: Character and Competence **04 hours**

Science vs. God, Holy books vs. Blind faith, Self management and good health, Science of reincarnation, Equality, Nonviolence, Humility, Role of women, All religions and same message, Mind your mind, Self control, Honesty, Studying effectively.

Unit 4: Engineering Ethics **04 hours**

Senses of 'Engineering Ethics', variety of moral issues, types of inquiry, moral dilemmas, moral autonomy, Kohlberg's theory, Gilligan's theory, consensus and controversy, models of professional roles, theories about right action, self interest, customs and religions, uses of ethical

theories, Valuing time, Co-operation and commitment, Code of ethics, Sample codes – IEEE, ASCE, ASME and CSI.

Text Books:

1. Chakraborty, S. K., Values and Ethics for Organization Theory and Practice, Oxford University Press, New Delhi, 2001

2. Gaur R. R., Sangal R., Bagaria G. P., *A foundation course in Value Education*, 2009.

3. Gaur R. R., Sangal R., Bagaria G. P*., Teacher's Manual*, 2009.

4. Mike Martin and RolandSchinzinger, *Ethics in Engineering*, Mc Graw Hill. New York, 1996.

Reference Books:

1. Govindrajan M., Natrajan S. and Senthil Kumar V. S., Engineering Ethics (including Human Values), Prentice hall of India Ltd., New Delhi, 2004.
2. Frankena, W. K., *Ethics*, Prentice Hall of India, New Delhi, 1990.
3. Dhar P. L., Gaur R. R., *Science and Humanism*, Commonwealth Publishers, 1990.
4. TripathyA. N., *Human Values*, New Age International Publishers, 2003.
5. Seebauer E. G. and Robert L. Berry, *Fundamentals of Ethics for Scientists andEngineers*, Oxford University Press, 2000.
6. Banerjee B. P., *Foundations of Ethics and Management*, Excel Books, 2005.
7. Bajpai B. L., *Indian Ethos and Modern Management*, New Royal Book Company, 2004.

4TH SEMESTER

Approved Vide Agenda Item No. 03 of Minutes of Meeting of Academic Council held on 11 July 17

B-TECH ELECTRICAL ENGINEERING, SEMESTER –IV TEACHING & EXAMINATION SCHEME WITH EFFECT FROM JULY 2017													
SR NO	CODE	SUBJECTS	TEACHING SCHEME			CREDITS	HOURS	EXAMINATION SCHEME					
								THEORY			PRACT		TOTAL
								CIE					
			L	T	P			MID	IE	ESE	CIE	ESE	
1	SH0401	Complex Analysis and numerical methods	3	2	0	4	5	30	10	60	00	00	100
2	EC0404	Electromagnetic	3	2	0	4	5	30	10	60	00	00	100
3	EL0401	Power System I	3	2	0	4	5	30	10	60	00	00	100
4	EL0402	Electrical Machines-II	4	0	2	5	6	30	10	60	40	60	200
5	EL0403	Control theory	3	2	0	4	5	30	10	60	00	00	100
6	EL0404	Electrical Measurements	3	0	2	4	5	30	10	60	40	60	200
7	CE0407	Cyber Security and Intellectual Property Right	1	0	0	0	1	30	10	60	00	00	100
TOTAL			**20**	**8**	**4**	**25**	**32**	**210**	**70**	**420**	**80**	**120**	900

Approved Vide Agenda Item No. 03 of Minutes of Meeting of Academic Council held on 11 July 17

Subject: **Complex Analysis and Numerical Methods**								
Program: **B.Tech. EC Engineering**				Subject Code: SH0401			Semester: **IV**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	2	0	4	60	00	40	00	100

1. Course outcome

After completion of this course students will be able to gain knowledge about following

- To provide an ability to understand, interpret and use the basic concepts: complex number, analytic function, harmonic function, Taylor and Laurent series, singularity, residue, conformal mapping, meromorphic function.
- To provide an ability to prove certain fundamental theorems about analytic functions, e.g. Cauchy's integral formula
- To provide an ability to determine the images of curves under simple complex mappings.
- To provide an ability to determine the stability of certain dynamical systems using complex functions.
- To provide an ability to use conformal mapping to solve certain applied problems regarding heat conduction, electrical engineering and fluid mechanics.
- To provide an ability to use Taylor and Laurent expansions to derive properties of analytic and meromorphic functions.

2. Contents:

UNIT-I **[12 Hours]**

Complex Analytic Functions:

Complex Numbers, Demoivere's Theorem, Roots of Complex Numbers, Elementary complex functions, Complex planes, Curves in complex planes, Concept of neighborhood in The complex plane, Analytic function, Cauchy- Riemann equations (Cartesian and polar forms – without proof), Harmonic functions, conformal mappings, some standard conformal transformations.

UNIT-II **[12 Hours]**

Interpolation

Finite differences and Interpolation: Finite differences Forward, Backward & Central difference operators and difference tables. Interpolation, Interpolation Formulae with equal intervals: Newton's forward, Newton's backward, central difference interpolation by Stirling's formulae

Interpolation Formulae with unequal intervals: Lagrange's & Newton's divided difference interpolation

Numerical Integration: Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule.

Numerical differentiation: Using Newton's forward and backward interpolation formula

UNIT-III **[12 Hours]**

Numerical Methods: Basic Errors.
Solution of Algebraic and Transcendental Equations: Bisection method, Regula-Falsi method, Newton-Raphson method, Convergence condition for these methods.
Numerical methods in Linear Algebra: Gauss-Jacobi, Gauss-seidel method
Largest Eigen values and corresponding Eigen vectors: By power method
Numerical Solutions of ordinary differential equations: Taylor's Method, Euler's Method, Improved Euler Method (Heun's Method), Runge-Kutta method of order four

UNIT-IV **[12 Hours]**

Complex Integration: Complex integration, Cauchy's integral theorem and Cauchy's integral formula (without proof), Singularities, Taylor's and Laurent's series, Cauchy-Residue theorem, Residues & Contour integration, Applications of residue to evaluate real integrals.

3. Text books:

1. Erwin Kreyszig: Advanced Engineering Mathematics (8^{th} Edition) Wiley Eastern Ltd., New Delhi (1999).

4. Reference Books:

1. R. V. Churchill and J. W. Brown: Complex variables and applications (7^{th} Edition), McGraw-Hill (2003)
2. B. V. Ramana: Higher Engineering Mathematics, McGraw Hill, New Delhi (2008).
3. Merel C Potter, J L Goldberg: Advanced Engineering Mathematics (3rd Edition) Oxford India Publication (2005).
4. Dr. B.S. Growl: Higher Engineering Mathematics, Khanna Publishers, New Delhi (2000).
5. R K Jain, S R K Iyengar: Advanced Engineering Mathematics. Third Edition, Narosa Publishing House (Reprint2014).

6. Murray Spiegel: Advanced Mathematics for Engineering & Science: (Schaum's Outline Series), TataMcGraw Hill Publication (2009).

5. Digital learning resources :

- http://freevideolectures.com/blog/2010/11/130-nptel-iit-online-courses/
- http://nptel.ac.in/video.php?subjectId=122107036
- http://ocw.mit.edu/index.htm
- https://www.khanacademy.org/

Subject: **Electromagnetics**								
Program: **B.Tech. Electrical Engineering**				Subject Code: EC0404			Semester: **IV**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	2	0	4	24/60	0	16/40	0	100

Course Outcomes :

- **a.** Student will be able to determine electric and magnetic fields due to specified charge and current distributions.
- **b.** Relate the physical basis of Maxwell's equations in integral form and differential form, and apply them for the solution of appropriate problems involving static as well as time varying fields.
- **c.** Apply the appropriate electric and magnetic field boundary conditions for a given problem involving their use. Analyze problems involving one-dimensional Poisson's and Laplace's equations.
- **d.** Basic knowledge of Uniform plane waves can be acquired.

SYLLABUS

UNIT-I **[12]**

Vector Analysis: Scalars & Vectors, Dot and cross products, Co-ordinate systems and conversions.

Electrostatics I: Coulomb’s law, Electric field intensity, Field due to continuous volume charge distribution, field of a Line charge, Field of a Sheet of charge, Concept of electric flux density, Gauss’s law and its applications, Differential volume element, Divergence, Maxwell’s first eqn. and divergence theorem.

UNIT-II **[10]**

Electrostatics II:

Energy and potential , potential difference, potential gradient, current and current density, continuity equation, conductor properties & boundary conditions, boundary condition for perfect dielectric materials, Poisson's and Laplace equation, Uniqueness theorem, Examples.

UNIT-III **[12]**

Steady magnetic field:

Biot-Savart's law, Ampere's circuital law, Point form of Ampere's circuital law, concept of flux density, Scalar and vector magnetic potential, Stoke's theorem for magnetic field, Magnetic boundary conditions.

Time Varying Fields and Maxwell's Equations:

Faraday's law, Displacement current, Maxwell's equations in point and integral forms for time varying fields

UNIT-IV **[12]**

The Uniform Plane Wave:

The wave equation, wave motion in free space, waves motion in perfect dielectric, Plane waves inside the lossy matter, Poynting vector and Wave power, Propagation in good conductor, Phenomena of skin effect, Reflection of uniform plane waves.

Text Books:

1. Engineering Electromagnetics, W H Hayt, J A buck, 7th Edition, TMH Publication

Reference Books:

1. Electromagnetic Waves & Radiating Systems, Edward C. Jordan, Keith G. Balmain, 2nd Edition, PHI publication.
2. Fields and Waves in Communication Electronics, Simon Ramo, John R. Whinnery, Wiley Publication

Web Resource:

1. nptel.ac.in/downloads/115101005/
2. https://www.studynama.com/.../368-Electromagnetic-Theory-pdf-lecture-notes-ebook..

Subject: **Power System I**								
Program: **B.Tech. Electrical Engineering**				Subject Code: EL0401			Semester: **IV**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	2	0	4	24/60	0	16/40	0	100

Course Outcome:

- Learn the component of power system. Transmission and Distribution.
- Learn the transmission line parameter for single phase and three phase system.
- Also know the Mechanical aspects, supply system, classification of substation and earthing concept.

SYLLABUS

UNIT-I **[10]**

Transmission and Distribution Systems

Electrical supply system, comparison of AC and DC systems, overhead versus underground systems, choice of working voltages for transmission and distribution transmission and distribution system architecture, cost comparison of overhead and underground systems

UNIT-II **[10]**

Load on Power Station

Structure of power system, Types of load, Variable load on power station, Load curve, important terms and factors, load duration curve, selection of generating units, base load and peak load, interconnected grid system.

Economics of power generation & Tariff

Cost of electrical energy, Expressions for cost of electrical energy, Methods of depreciation, Cost analysis of power plants, types of tariffs- flat rate, block rate, two-part and three-part, fixed and running charges, comparison of tariffs and computation of monthly/annual bill.

UNIT-III **[12]**

Overhead Transmission Lines

Components of over head line**,** line support, types of conductors; Overhead line insulators, types of insulators- pin, suspension and strain insulators, insulator materials, insulator string; Calculation of voltage distribution and string efficiency, methods of equalizing voltages, use of guard rings, sag in over head lines, calculation of sag with equal level support and unequal level support with effect of wind and ice loading.

Corona

Theory of corona formation, factors affecting corona, calculation of potential gradient, merits and demerits of corona.

UNIT-IV **[14]**

Line Parameters

Inductance of a single phase 2 wire line, conductor types, Flux linkage of one conductor in a group, Inductance of a composite conductor lines, Transposition, Inductance of a three phase lines, Double circuit three phase lines, bundled conductors, skin effect, proximity effect, Capacitance of a 2 wire line, Capacitance of a three phase line with equilateral spacing and unsymmetrical spacing, effect of earth on transmission line capacitance, method of GMD, Potential Gradient.

Underground Cables and their Characteristics

Elements of a power cable, properties of the insulation and sheath materials, classification of power cables: belted, screened and pressure cables, dielectric stress in cable insulation, grading of cables: capacitance grading and inter-sheath grading, measuring capacitances and charging current in a cable, HVDC cables, faults in AC & DC cables.

Text Books

1. Weedy B.M. and Cory B.J., "Electric Power Systems", 4th Ed.,Wiley India.**2008**
2. Grainger J. J. and Stevenson W.D., "Elements of Power SystemAnalysis", Tata McGraw-Hill Publishing Company Limited.**2008**

Reference Book

1. Gonen T., “Electric Power Transmission System Engineering: Analysis and Design”, John Wiley and Sons.**1990**
2. Nagrath I. J. and Kothari D. P., “Modern Power System Analysis”, 3rd Ed., Tata McGraw-Hill Publishing Company Limited. **2008**
3. Roy S., “Electrical Power System- Concepts, Theory and Practices”, Prentice Hall of India Private Limited. **2007**

Web Resource

1. nptel.ac.in/downloads/108101040/
2. www.erforum.net/

Subject: **Electrical Machines-II**								
Program: **B.Tech. Electrical Engineering**				Subject Code: EL0402			Semester: I**V**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
4	0	2	5	24/60	24/60	16/40	16/40	200

Course Outcome:

- Learn synchronous generator, its characteristics and its applications in power.
- Learn synchronous motor, its characteristics and its applications in electrical engineering.
- Learn special machines its characteristics and its applications in electrical engineering.

Syllabus

UNIT-I **[10]**

Induction Machines I

Constructional features of wound rotor and squirrel cage induction machine. Qualitative description of working of poly-phase induction machine from rotating field view point; Coupled circuit model of an idealized three-phase machine, voltage equations of the model, equivalent circuit, phasor diagram, circle diagram. Concept of leakage reactance and its importance on machine performance and design; Double-cage and deep-bar squirrel cage rotor induction motor.

UNIT-II **[12]**

Induction Machine II

Generator action, methods of excitation, characteristics. Space and time harmonics and their effect on motor performance. Methods of starting induction motors; Principles of speed control (i)stator voltage control (ii) control of speed of rotating field (iii)control of slip speed (iv) rotor resistance control (v) V/f control. Effect of voltage injection in secondary of slip-ring induction motor, action of commutator as a frequency converter.

UNIT-III **[12]**

Single-phase induction motor: working, double revolving field theory, equivalent circuit, torque-speed characteristic, performance.

Synchronous Machines I: Constructional features of salient pole and cylindrical rotor three phase synchronous machine. Generated emf, winding coefficients, harmonics in generated emf, tooth ripples and armature reaction; Coupled circuit model of an idealised salient pole synchronous machine, application of d-q-o transformation, operation under balanced steady state conditions; Power-angle equations of salient pole and cylindrical rotor synchronous machines.

UNIT-IV **[11]**

Synchronous Machines II: Voltage regulation of salient pole and cylindrical rotor machine,effect of saturation on voltage regulation. Steady state operating characteristic of synchronous motor; V curves and phasor diagram, hunting Parallel operation of synchronous machines, synchronization and load division, synchronous machine on infinite bus, stability and hunting in synchronous machine.

Text Books

1. Fitzgeraid A. E., Kingsley C. and Kusko A., " Electric Machinery " , 6th Ed., McGraw-Hill International Book Company.2008
2. Say M. G., " The Performance and Design of Alternating CurrentMachines " , CBS Publishers and Distributors.2005

Reference Book

3. Nagrath I. J. and Kothari D. P., " Electrical Machines " , 3rd Ed., Tata McGraw-Hill Publishing Company Limited. 2004
4. Langsdorf A. S., " Theory of AC machines " , 2nd Ed., Tata McGraw-Hill Publishing Company Limited. 2008
5. Kimbark E.W., " Power System Stability, Vol. III: SynchronousMachines " , Wiley India.2008
6. Chapman S. J., "Electric Machinery Fundamentals", 4th Ed.,McGraw-Hill International Book Company.2005

Web Resource

www.nptel.ac.in

Laboratory Experiment List

1. Three phase Synchronous machine components
2. To study the variation of terminal voltage of Alternator on load
3. OC test on three phase Alternator
4. SC test on three phase Alternator
5. Determination of parameters of Synchronous machine
6. V curves of a three - phase Synchronous motor
7. Improvement of power factor using synchronous motor
8. Measurement of insulation of three phase Synchronous machine
9. To study the construction and working principle of Reluctance motor
10. To study the construction and working principle of Hysteresis motor
11. To study the construction and working principle of Stepper motor
12. To study the construction and working principle of Servo motors

Subject: **Control Theory**								
Program: **B.Tech. Electrical Engineering**				Subject Code:EL0403			Semester: **IV**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	2	0	4	24/60	0	16/40	0	100

Course Outcome:

- To learn the basic concepts of linear control theory and its analysis.
- Different system representation, block diagram reduction and Mason's rule.
- Time response analysis of LTI systems and steady state error.
- The open loop and closed loop frequency responses of systems.
- Stability concept using bode plot, routh- hurwtiz stability criterion and root locus.
- Frequency domain

SYLLABUS

UNIT-I **[10]**

Introduction

Introduction, Open-loop system and its examples, Closed-loop system and its examples, Open-loop vs Closed-loop

Mathematical Modeling

Modeling of Mechanical system, Modeling of Electronic and electrical system, Modeling of Liquid-level system, Transfer function of system, Modeling in state-space

Block diagram and Signal Flow graph

Block diagram formulation, Block diagram reduction, Signal Flow graph, Mason's Gain formula

UNIT-II **[12]**

Transient response analysis

Standard test signals, First-order and second order systems, Higher order systems, Transient response of system, Steady-state error for unit , ramp and parabolic inputs.

UNIT-III **[12]**

Time domain Stability Analysis

RH stability criteria, Effect of Proportional, derivative and integral control, MATLAB simulations

Root Locus

Introduction, Rules for constructing the root locus, System analysis with the help of Root-locus Root-locus plot using MATLAB

UNIT-IV **[12]**

Frequency Response Analysis

Introduction, Specification for frequency response, Polar-plots, Bode plots, Nyquist plots Stability analysis, MATLAB simulations

Text Books

1. Katsuhiko Ogata, "*Modern Control Engineering*", 4th Ed, Prentice Hall of India.

Reference Books

2. Benjamin C.Kuo, "*Automatic Control Systems*", John Wiley & Sons
3. Norman S Nise, "*Control system Engineering*", 4th Ed., Wiley-India Edition
4. I J Nagrath, M Gopals "*Control system Engineering*", 5th Ed.,

Web Resource

1. www3.imperial.ac.uk
2. mitra.ac.in
3. www.nptel.ac.in

Subject: **Electrical Measurement**								
Program: **B.Tech. Electrical Engineering**				Subject Code: EL0404			Semester: **IV**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
4	0	2	5	24/60	24/60	16/40	16/40	200

Course Outcome:

- Learn the measurement of various electrical parameter in this subject.
- Learn Measuring equipment, accuracy, range and other parameter of the Meter.
- Know the construction and application of the instrument transformers.

SYLLABUS

UNIT-I **[10]**

Introduction

SI units, static and dynamic characteristics of electrical instruments, Errors in measurement, reproducibility, drift, accuracy and precision, sensitivity, discrimination and resolution.

Analog Instruments

Classification, Principle of operation, operating forces, construction, torque/weight ratio, control system, damping system.

Galvanometers

Galvanometer equation in dc and ac measurements; D ' Arsonval, vibration and ballistic type galvanometers.

UNIT-II **[14]**

Ammeters and Voltmeters

Types of instruments, PMMC, MI, Electrodynamic, Electrothermic Instruments, Hot wire, thermocouple, Electrostatic instruments, Rectifier Instruments.

Wattmeters

Electrodynamometer and induction wattmeters, errors and their compensation, multi-element wattmeter.

Energy Meters

Induction energy meter, calibration devices, errors and their compensation, polyphase energy meter, testing.

Special Meters

Maximum demand indicator, bi-vector and trivector meters, power factor and frequency meters.

UNIT-III **[11]**

Potentiometer

DC potentiometer, polar and coordinate ac potentiometers.

Resistance Measurement

Measurement of low, medium and high resistances, Wheatstone bridge method, loss of charge method, Kelvin's double bridge method.

UNIT-IV **[10]**

A.C. Bridges

General principles, sensitivity analysis; Hay, Owen and Heaviside Campbell bridges for inductance; De Sauty and Wein bridges for capacitance; High-voltage Schering Bridge and grounding.

Instrument Transformers

Construction, phasor diagrams, error analysis and compensation, testing and application of measuring CT and VT.

Test Books

1. Golding E. W. and Widdis F. C., "Electrical Measurements and Measuring Instruments", 5th Ed., A.H. Wheeler and Company. 1994

Reference Book

2. Harris F. K., "Electrical Measurement", Wiley Eastern PrivateLimited.1974

3. Stout M. B., "Basic Electrical Measurements", Prentice Hall of IndiaPrivate Limited.1984

Web Resource

1. www.eng.hmc.edu/NewE80/PDFs/BasicElectricalMeasurements2012.pdf
2. nptel.ac.in/downloads/108105053/

Laboratory Experiment List

1. To study the Cathode Ray Oscilloscope (CRO)
2. Measurement of low resistance using Kelvin bridge
3. Measurement of inductance using Maxwell bridge
4. Measurement of capacitance using Schering bridge
5. To Study Characteristics of LVDT or Displacement Transducers
6. Measurement of strain and linear range of operation using Strain Gauge transducer
7. Characteristics of Thermocouple temperature transducer.
8. To find the characteristics of thermocouple and to measure the temperature using thermocouple.
9. Proximity sensor and its applications
10. Analyze analog and digital multimeter for various measurements.
11. Demonstrate functionality of function generator and its use as a test and measurement equipment.

Subject: **Cyber Security and Intellectual Property Rights**								
Program: **B.Tech. Electrical Engineering**			Subject Code: CE0407			Semester: **IV**		
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
01	00	00	00	60	00	40	00	100

Learning Objectives

1. To facilitate understand & critical understanding about Cybercrimes, Ethical Hacking, cyber security, forensics and cyber laws
2. Exploration of the legal and policy developments in various countries for cyber space
3. To provide in-depth knowledge of Information Technology Act, 2000 including Information Technology Amendment Act, 2008
4. Understanding e-Governance, Electronic Contracts, e-Banking & Secure electronic records

UNIT-I **[3 hours]**

Introduction:

Information Security Overview, Cyber security, Cyber security objectives and policies, Differences between Information Security & Cyber security, Cyber security Principles, Introduction of Cyber crime, Classifications of Cybercrimes.

UNIT-II **[3 hours]**

Security Threats and vulnerabilities:

Overview of Security threats, Hacking Techniques, Password Cracking, Insecure Network connections, Malicious Code, Programming Bugs, Cyber crime and Cyber terrorism, Information Warfare and Surveillance. Applicationsecurity(Database,E-mailandInternet).

UNIT-III **[3 hours]**

Overview of Security Management:

Overview of Security Management , Security Policy , Security Procedures and Guidelines , Risk Management , Security Laws**, System Security** (Desktop, email,web), Intrusion Detection Systems, SecurityTechnology-FirewallandVPNs ,Backup SecurityMeasures.

UNIT-IV **[3 hours]**

Cyber law- Intellectual property right:

Introduction, Objectives of Intellectual property law, Types of IPR, Advantages of IPR, IPR in India, Offences and Penalties.

Text Books

1. "Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", Nina Godbole, SunitBelapur, Wiley India Publications, April, 2011

Reference Books

1. CharlesP.Pfleeger,ShariLawerancePfleeger,"AnalysingComputerSecurity", PearsonEducationIndia.
2. .K.Pachghare,"CryptographyandinformationSecurity",PHI LearningPrivateLimited,DelhiIndia.
3. Dr.SuryaPrakashTripathi,RitendraGoyal,PraveenkumarShukla,"Introductionto InformationSecurityand CyberLaw"WilleyDreamtechPress.
4. Schou,Shoemaker,"InformationAssurancefortheEnterprise",TataMcGrawHill.
5. CHANDER,HARISH**,"**CyberLawsAndIt Protection**"**,PHILearningPrivateLimited,Delhi,India

Online courses:

- https://www.youtube.com/watch?v=yjmQurhbVas
- https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-858-computer-systems-security-fall-2014/video-lectures/
- https://www.youtube.com/watch?v=mut5Z9Ajva4
- https://www.youtube.com/watch?v=MI5KxHookDs
- https://www.youtube.com/playlist?list=PLRkCJvWSrxbt-xBX5cjzTr4pE0SZ-pIOf

5TH SEMESTER

Approved Vide Agenda Item No. 03 of Minutes of Meeting of Academic Council held on 11 July 17

B-TECH ELECTRICAL ENGINEERING, SEMESTER –V TEACHING & EXAMINATION SCHEME WITH EFFECT FROM JULY 2017													
SR NO	CODE	SUBJECTS	TEACHING SCHEME			CREDITS	HOURS	EXAMINATION SCHEME					
								THEORY			PRACT		TOTAL
								CIE					
			L	T	P			MID	IE	ESE	CIE	ESE	
1	EL0501	Power Electronics	3	0	2	4	5	30	10	60	40	60	200
2	EL0502	Microprocessor & Microcontroller Interfacing	3	0	2	4	5	30	10	60	40	60	200
3	EL0503	Electrical Design	3	2	0	4	5	30	10	60	00	00	100
4	EL0504	Industrial Instrumentation	3	0	2	4	5	30	10	60	40	60	200
5	EL0505	Power System-II	4	0	2	5	6	30	10	60	40	60	200
6	EL0506	Electrical Power Utilization & Traction	3	2	0	4	5	30	10	60	00	00	100
7	SH0507	Technical Communication and Soft Skills	1	0	0	0	1	30	10	60	00	00	100
TOTAL			**20**	**04**	**8**	**25**	**32**	**210**	**70**	**420**	**200**	**300**	**1200**

Approved Vide Agenda Item No. 03 of Minutes of Meeting of Academic Council held on 11 July 17

Subject: **Power Electronics**								
Program: **B.Tech. Electrical Engineering**				Subject Code: EL0501			Semester: **V**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	0	2	5	24/60	24/60	16/40	16/40	200

Course Outcome:

After completion of this course, expected outcome from the students,

- Relate basic semiconductor physics to properties of real devices, and combine circuit mathematics and characteristics of linear and non-linear devices to formulate and analyse system designs.
- Learn the basic concepts of operation of different types of converters in steady state in continuous and discontinuous modes and be able to analyze basic converter topologies.
- Apply skills in engineering estimation to analyze real-world situations, identify the important features and develop a valid approach to the solution.

SYLLABUS

UNIT-I **[12]**

Solid State Power Devices

Principle of operation of SCR, dynamic characteristic of SCR during turn ON and turn OFF, parameters of SCR, dv/dt and di/dt protection, snubber circuit, commutation circuits; Introduction of modern power devices and their operating characteristics. MOSFET, IGBT, MCT, UJT, Diac and Triac

UNIT-II **[10]**

Single-phase Converter

Half wave converter, 2-pulse midpoint converter, half controlled and fully controlled bridge converters, input current and output voltage waveforms, effect of load and source impedance, expressions for input power factor, displacement factor, harmonic factor and output voltage, effect of free-wheeling diode, triggering circuits.

Dual Converter

Control principle, circulating current and circulating current free modes of operation of single-phase dual converter.

UNIT-III **[10]**

Three-phase Converter

Half wave, full wave, half controlled and fully controlled bridge converters.

Single-phase A.C. Regulator

Principle of operation, effect of load inductance, firing pulse requirement.

Single-phase Cycloconverter

Principle of operation, waveforms, control technique.

UNIT-IV **[12]**

Choppers

Single quadrant chopper, voltage commutated chopper, current commutated chopper, load commutated chopper, design of commutating components, continuous and discontinuous modes of operation, expression for average output voltage and load current.

Voltage Source Inverter

Single-phase half bridge inverter, full bridge inverter, voltage and current waveforms, Mc-Murray commutation circuit, design of commutation circuit, three-phase bridge inverter, voltage and current waveforms with delta connected RL load, voltage and frequency control of inverters, concept of PWM inverters

Text Books

1. Bimbhra, P. S., "Power electronics", Khanna Publishers, New Delhi, 2001
2. Rashid, M. H., " Power Electronics Circuits, Devices, and Applications, Prentice-Hall of India Pvt. Ltd., New Delhi, 2nd edition, 1999.
3. Singh, M. D., Khanchandani, K. B "Power electronics", Tata McGraw-Hill Publishing Co. Ltd., New Delhi, 2001.

Reference Books

1. Ned Mohan, Tore M. Undeland and William P. Robbins, “Power Electronics Converters, Applications, and Design”, John Willey & Sons, Inc., 2ndEdition, 1995.
2. Agrawal, J. P., "Power electronic systems: Theory and design" Addison Wesley Longman

(Singapore) Pte. Ltd. New Delhi, 2001
3. Boylestad R. and Nashelsky L., “Electronic Devices and Circuit Theory”, 9th Ed., Prentice Hall of India Private Limited. 2008
4. Gayakward R. A., “ OP-AMPs and Linear Integrated Circuit Technology ” , 4th Ed., Pearson Education. 2008
5. Dubey G. K., Doradla S. R., Joshi A. and Sinha R. M. K., Thyristorised Power Controllers”, New Age International Private Limited. 2008

Web Resource

1. nptel.ac.in/downloads/108105066/

Laboratory Experiment List

1. R-RC Triggering
2. Characteristics Of SCR
3. Characteristics Of MOSFET
4. Characteristics Of IGBT
5. UJT And Pedestal Triggering
6. Four Modes Of TRIAC And DIAC Characteristics
7. Phase Control of TRIAC
8. Half Wave controlled Rectifier
9. Full Controlled Rectifier
10. Parallel Inverter

Subject: **Microprocessor and microcontroller Interfacing**								
Program: **B.Tech. Electrical Engineering**				Subject Code: EL0502			Semester: **V**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	0	2	4	24/60	24/60	16/40	16/40	200

Course Outcome:

- Getting familiar with the architecture of 8051 family microcontrollers.
- Learn the assembly and embedded C language Programming of 8051.
- Learn the interfacing of microcontroller and based on that develop various Application using Microcontroller.

SYLLABUS

UNIT-I **[12]**

MICROPROCESSOR SYSTEM ARCHITECTURE

Introduction, Registers, concept of address and data buses, system, control signals, basic bus timing, memory (RAM, ROM), input output devices, Microcomputer systems, over view of 8-16-32 bit Microprocessor and microcontroller family. Bus timing and instruction timing, de-multiplexing of buses, generation of control signals.

THE 8051 MICROCONTROLLER ARCHITECTURE

Introduction, 8051 family microcontrollers, hardware architecture, input/output pins, I/O ports and circuits, on chip ram, general purpose registers, special function registers.

UNIT-II **[11]**

ASSEMBLY LANGUAGE PROGRAMMING OF 8051

Concept of IDE (assembler, compiler, linker, de-bugger), addressing modes, data move instructions, arithmetic and logical instructions, jump, loop and call instructions, Bit addressable instructions and special instructions concept of timers-counters and interrupt.

UNIT-III **[11]**

PROGRAMMING IN EMBEDDED C

Introduction, Date types in embedded C, arithmetic and logical operators, Control statements and loops in embedded C, Functions and Arrays in embedded C. Programming of input/ output ports, Programming of Timer & counters, writing interrupt service routines in Embedded C, concepts of subroutines, interrupt service routine

UNIT-IV **[11]**

8051 INTERFACING

Concept of Serial Communication, 8051 interfacing and programming of UART in embedded C. Introduction, Interfacing and C programming of 8051 with keyboard, Interfacing and C programming of 8051 with 7-segment display, Interfacing and C programming of 8051 with LCD display, Interfacing and C programming of 8051 with ADC-DAC and sensors.

Text Books

1. R.S.Gaonker, "Microprocessor Architecture, programming, and application", wiley eastern limited.
2. Kenneth J. Ayala, "The 8051 Microcontroller", Penram International 3rd edition.
3. M. Mazidi and others, "The 8051 Microcontroller and Embedded Systems", PRENTICE Hall Of India, 3rf edition.

Reference Book

1. Michael slater, "Microprocessor based Design", PRENTICE Hall Of India, 3rd edition.
2. Badri Ram, "Fundamentals of microprocessors and microcomputers", Dhanpat Rai.

Web resource

1. https://www.iare.ac.in/sites/default/files/lecture_notes/MPID%20Notes.pdf
2. nptel.ac.in/downloads/106108100/

Laboratory Experiment List

1. Introduction to 8051 keil µ-vision4 Simulator and Trainer Kit.

2. Simulate 8051 assembly Level Programming based on Arithmetic operations.

3. Simulate 8051 assembly language programming based on data transfer and branch operations.

4. Simulate 8051 assembly language programming based on logical and bit addressable operations.

5. Simulate and perform 8051 program based on I/O operations.

6. Generate PWM signal using 8051 microcontroller.

7. Simulate 8051 basic program based on Embedded C Language.

8. Simulate Program based on Timer and interrupt operation of 8051 using embedded C Language.

9. Simulate Program based on serial communication of 8051 using embedded C Language.

10. Interface 16x2 LCD with 8051.

11. Interface DAC with 8051

Subject: **Electrical Design**								
Program: **B.Tech. Electrical Engineering**				Subject Code: EL0503			Semester: **V**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	2	0	4	24/60	0	16/40	0	100

Course Outcome:

(Note: After completion of this course, the students are expected to ….

- Study design of fundamental magnetic circuits, design of Electromagnets:, design of small Transformers and Choke coils, Design of starters, field regulators & control panels, Design consideration of Electrical Installation.
- Learn the estimating and costing of residential and commercial building.
- Students will be able to design armature windings.

SYLLABUS

UNIT-I **[10]**

General Design Aspects

Basic principles of magnetic circuits – use of B-H curves in magnetic circuits – Calculations of MMF for air gap and teeth – Real and apparent flux density – Effect of saturation – flux density distribution -calculation of magnetizing current – Field Form – Introduction – carter's fringe curves – flux plotting – air gap flux distribution factor (field form factor) – actual flux distribution factor, Magnetizing current calculation, Leakage Reactance calculation for various types of slots, Iron loss calculation concepts.

UNIT-II **[12]**

Design of Electromagnets

Introduction – Types of Electromagnets – Design of Magnet coils – Problems on above topics – Design of small Flat-faced armature type circular magnet – Design of large-face armature type circular magnet – Design of Horse shoe type magnet – Design of plunger type magnet – Design of

magnetic clutches

Design of starters, field regulators & control panels:

A.C. and D.C. starters, Grading of starting resistance for DC shunt motor, DC series motor and 3-phase induction motor starter field regulator in case of DC shunt motor and DC shunt generator, design problem, and control panels.

UNIT-III **[10]**

Design of small Transformers and Ballast:

Design of Small single-phase transformers — Design of variable air gap single-phase choke coil. Design of variable air gap three-phase choke coil. Design of ballast.

Estimating Costing for Residential, Commercial &Service Connections (1- ø &3-ø):

Tenaments , Row houses , Bungalows , Flats , Multi – Storied Buildings ,Internal Wiring Estimation (Length of wire) Commercial Complexes like Offices , Hospitals , Hotels, Theatres . Internal Wiring Estimation (Length of wire) , Lighting Series & Hoardings.

Design consideration of Electrical Installation:

Types of load, Electrical Supply Systems, Wiring systems, Load Assessment, Permissible voltage drops & Conductor size calculations, Control panel, Illumination Schemes.

UNIT-IV **[14]**

Armature Windings

DC windings

Simplex & Duplex windings, Lap & Wave windings, Applications, Basic terms related to armature windings, Dummy Coils, Equalizer connections, split coils.

AC windings

Introduction, No. of phases, Phase spread, concentric winding, Hemitropic winding, Whole coil winding, Mush winding, Double layer windings, Integral slot lap and wave winding. Fractional slot lap & wave windings. Performance analysis of various windings.

Text Books:

1. Electrical Estimating & Costing by N. Alagappan & S. Ekambaram (TTTI, Madras) - (Tata mcgrawhill Ltd).

2. Electrical Estimating & Costing by Surjit Singh (Dhanpat Rai & sons).

Reference Book

1. Electrical Machine Design by A. K. Shawney,Dhanpatrai & sons. Pub.
2. Electrical Design, Estimating & Costing By K.B.Raina & S.K.Bhattacharya
3. (TTTI, Chandigarh) – (Wiley Eastern Ltd.).
4. Electrical Installation, Estimating & Costing By J.B. Gupta (S.K.Kataria & Sons).
5. Electrical Machine Design by R. K. Agrawal.
6. Electrical Machine Design by V. N. Mittle, TMH publications.
7. Electrical Machine Design by S. K. Sen, Oxferd Publications.
8. Electrical Machine Design by Gray A. Macgraw Hill publications.

Web resource

www.nptel.ac.in

Subject: **Industrial Instrumentation**								
Program: **B.Tech. Electrical Engineering**				Subject Code: EL0504			Semester: **V**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	0	2	4	24/60	24/60	16/40	16/40	200

Course Outcome:

After completion of this course, expected outcome from the students,

- Learn various transducers for strain measurement, displacement measurement, force, torque, pressure, flow, level and temperature measurement.
- Learn various recorders.
- Learn Digital Data Acquisition systems & control.

SYLLABUS

UNIT-I **[12]**

Transducers: Introduction to instrumentation system, static and dynamic characteristics of an instrumentation system, principles and classification of transducers, Electrical transducers, basic requirements of transducers

Strain Gauge and Strain Measurement: Factors affecting strain measurements, Types of strain gauges, theory of operation of resistive strain gauge, gauge factor, types of electrical strain gauges, strain gauge materials, gauging techniques and other factors, strain gauge circuits and temperature compensation, applications of strain gauges.

Displacement Measurement:Resistive potentiometer (Linear, circular and helical), L.V.D.T., R.V.D.T. and their characteristics, variable inductance and capacitance transducers, Piezo electrical transducers-output equations and equivalent circuit, Hall effect devices and Proximity sensors, Large displacement measurement using synchros and resolvers, Shaft encoders.

UNIT-II **[12]**

Forces and Torque Measurement:Load cells and their applications, various methods for torque measurement. Use of torque wrenches

Pressure Measurement:Mechanical devices like Diaphragm, Bellows, and Bourdon tube for pressure measurement, Variable inductance and capacitance transducers, Piezo electric transducers, L.V.D.T. for measurement of pressure, Low pressure and vacuum pressure measurement using Pirani gauge, McLeod gauge, Ionization gauge,Pressure gauge calibration.

Flow Measurement:Differential pressure meter like Orifice plate, Venturi tube, flow nozzle, Pitot tube,Rotameter, Turbine flow meter, Electro magnetic flow meter, hot wire anemometer, Ultrasonic flow meter.

UNIT-III **[10]**

Level Measurement: Resistive, inductive and capacitive techniques for level measurement, Ultrasonic and radiation methods, Air purge system (Bubbler method).

Temperature Measurement:Resistance type temperature sensors – RTD & Thermister, Thermocouples & Thermopiles, Different types of Pyrometers. Humidity measurement and Moisture measurement techniques. infrared guns

UNIT-IV **[11]**

Recorders: X - Y, strip chart and circular type graphic recorders - indicating, recording and controlling instruments, multichannel recorders. Introduction to digital recorder.

Digital Data Acquisition systems & control : Use of signal conditioners, scanners, signal converters, recorders, display devices, A/D & D/A circuits in digital data acquisition. Instrumentation systems. Types of Instrumentation systems. Components of an analog Instrumentation Data – Acquisition system. Multiplexing systems. Uses of Data Acquisition systems. Use of Recorders in Digital systems. Digital Recording systems.Modern Digital Data Acquisition system. Analog Multiplexed operation, operation of sample Hold circuits.

Text Books

1. Rangan C. S., Sarma G. R. and Mani V. S. V., “Instrumentation Devices and Systems”, 2nd Ed., Tata McGraw-Hill Publishing Company Limited. 2008
2. Doebelin E. O. and Manik D. N., “Measurement Systems ” , 5th Ed.,Tata McGraw-Hill Publishing Company Limited.2008

Reference Book

1. Johnson C. D., “Process Control Instrumentation Technology”, 8thEd., Prentice Hall of India Private Limited.2008
2. Cooper W. D. and Helfrick A. D, “Modern Electronic Instrumentation and Measurement Techniques”, Pearson Education.2008
3. Oliver B. M. and Cage J. M., “Electronic Measurement and Instrumentation”, McGraw-Hill International Book Company. 1983
4. Anand M. M. S., “ Electronic Instruments and Instrumentation Technology ” , Pearson Education. 2008

Web Resource

1. nptel.ac.in/courses/108105064/
2. https://lecturenotes.in/subject/42/industrial-instrumentation

Subject: **Power System-II**								
Program: **B.Tech. Electrical Engineering**				Subject Code: EL0505			Semester: **V**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
4	0	2	5	24/60	24/60	16/40	16/40	200

Course Objective:

After completion of this course, expected outcome from the students,

- To study short circuit symmetrical and unsymmetrical condition.
- To study power flow Analysis using different mathematical methods.

SYLLABUS

UNIT-I **[10]**

Representation of Power System Components

Introduction, single phase solution of balanced three phase networks, the one line diagram and the impedance or reactance diagram, per-unit (pu) system, complex power, synchronous machine, representation of loads.

Characteristics and Performance of Power Transmission Lines

Short and medium transmission lines, Line performance, effect of capacitance, charging currents, short and medium lines, calculation by nominal-T, nominal- π and end- condenser method, regulation and efficiency, Concept of ABCD constants, the long transmission line-rigorous solution, evaluationof ABCD constants, interpretation of long line equation, surge impedance and surge impedance loading, the equivalent circuit of a long transmission line, power flow through a transmission line, circle diagrams, Ferranti effect.

UNIT-II **[13]**

Review of Symmetrical Components and Its Application to Power System

Symmetrical component transformation, phase shift in star-delta transformers, sequence impedance of transmission lines, sequence impedance and sequence network of power system,

sequence impedance and network of synchronous machine, sequence impedance of transmission lines, sequence impedance and networks of transformers, construction of sequence networks of power systems.

Symmetrical Fault Analysis

Introduction, transient on a transmission line, short circuit of a synchronous machine on no load, short circuit of a loaded synchronous machine, balanced three phase fault, short circuit capacity, fault analysis using bus impedance matrix, selection of protective equipments.

UNIT-III **[13]**

Unsymmetrical Fault Analysis

Symmetrical component analysis of unsymmetrical faults, single line to ground (LG) fault, line to line (LL) fault, double line to ground (LLG) fault, open conductor faults, bus impedance matrix method for analysis of unsymmetrical faults.

UNIT-IV **[10]**

Power System Transients

Types of system transients, factors affecting transients, reflection and refraction of traveling waves at different line termination, surge impedance, transient over voltages due to lightning, theory of ground wires, direct stroke to a tower, capacitive switching, kilometric fault, ferro- resonance, protection of power systems against transients and insulation coordination.

Text Books

1. G.W. Stagg & A. H. EI-Abaid, “Computer methods in Power System Analysis”, McGraw Hill, New York.
2. W. D. Stevenson , “Element of Power System Analysis”, Mc Graw Hill, 1982.
3. Nagrath & kothari, “ Power System Engineering”, TMH publishing Company Ltd.

Reference Book

1. C.L.Wadhwa, “Electric Power System”, New Age International Ltd.
2. C. S. Indulkar and D P Kothari, “Power System Transients, A Statistical Approach”, Prentice Hall of India Pvt Ltd., New Delhi.

3. N. G. Hingorani, J Gyugi, “Understanding FACTS”, IEEE Press.
4. K. Bhattacharya, MHT Bollern and J. C. Doolder, “Operation of Restructured Power Systems”, Kluwer Academic Publishers, USA, 2001.

Web Resource

1. nptel.ac.in/downloads/108101040/
2. https://www.smartzworld.com/notes/power-system-ii-ps-ii/

Subject: **Electrical Power Utilization and Traction**								
Program: **B.Tech. Electrical Engineering**				Subject Code: EL0506			Semester: **V**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	2	0	4	24/60	0	16/40	0	100

Course Outcome:

(Note: After completion of this course, the students are expected to ….

- Maintain/Troubleshoot various lamps and fittings in use.
- Describe various electric heating and welding equipment used in industries.
- Explain the Electric Drive and elevator used in industries.
- Develop the concept of Electric Traction system.
- Study & develop various domestic electrical appliances.

SYLLABUS

UNIT-I **[08]**

Introduction

Type of electric drives, choice of motor, starting and running characteristics, speed control, temperature rise, particular applications of electric drives, types of industrial loads, continuous, intermittent and variable loads, load equalization.

UNIT-II **[11]**

Traction Electric

Traction System, Choice of traction system for India, Battery Drive, hybrid drive, flywheel drive, tramways, trolley bus.

Track Electrification:

DC system, AC system, composite system, comparison between AC & DC system, traction mechanics, types of services, speed time curve, average speed, schedule speed, tractive effort, power of traction motor, specific energy consumption.

UNIT-III **[12]**

Mechanics of train Movement

Coefficient of Adhesion, Power supply arrangements, remote control centre, function of DC substation, Block diagram of AC Electric locomotive, OHE, polygonal OHE, OHE supporting structure, current collection system.

Traction Motors

Suitability of motor, traction motor control, drum controller, bridge transition controller, series-parallel starting, metadyne control, multiple unit control, wheel arrangement, braking, types of breaking, mechanical breaking, electrical breaking, regenerative braking.

UNIT-IV **[14]**

Illumination

Introduction, Definitions, sources of light, Inverse square law of illumination, requirements of good lighting, lamp fittings, lighting systems, CFL, LED, outdoor lighting system, photometers.

Electric Heating

Introduction, heating methods, resistance heating, radiant heating, electric arc furnaces, induction furnaces, dielectric heating.

Introduction to Electric and hybrid vehicles:

Configuration and performance of electric vehicles, traction motor characteristics, tractive effort, transmission requirement, vehicle performance and energy consumption.

Text Books:

1. Electrical Power Utilization, O.S. Taylor, Orient Longman

Reference Book

1. Utilization of electrical power & electric traction, J. B. Gupta, S. K. Kataria Publications
2. A course in Electrical Power: Soni, Gupta and Bhatnagar, Dhanpat Rai & Sons
3. Modern electric traction, H. Partab, Dhanpat Rai publications

Web Resource

1. www.crectirupati.com
2. notes.specworld.in › EEE Branch

Subject: **Technical Communication and Soft Skills**								
Program: **B.Tech. Electrical Engineering**			Subject Code: SH0507			Semester: **V**		
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
1	0	0	0	60	00	40	00	100

Course Objectives:

1. To enable students to interact with a degree of fluency and spontaneity that makes regular interaction with fluent English speakers quite possible without strain for either party.
2. To understand with ease virtually everything heard or read.
3. To express themselves spontaneously, very fluently and precisely, differentiating finer shades of meaning even in the most complex situations.
4. To understand sentences and frequently used expressions related to areas of most immediate relevance (e.g. very basic personal and family information, shopping, local geography, employment).
5. To communicate in simple and routine tasks requiring a simple and direct exchange of information on familiar and routine matters
6. To understand the main ideas of complex text on both concrete and abstract topics, including technical discussions in their field of specialization.

Course Content:

	Sr. No.	**Content**
Listening	1	**Listening: Cloze test**
	2	**Listening to Talks (BBC, TED) 1**
	3	**Listening to Talks 2**
Speaking	**4**	**Phonetics: Sounds & Symbols & Accent Patterns**
	5	**Vocabulary Games: Intermediate Level**
	6	**Vocabulary Games: Intermediate Level**
	7	**Building Dialogues: Situational Conversation**
	8	**Role Play**
	9	**Group Discussion**

Reading	**10**	**How to Read effectively**
	11	**Reading to Remember : SQ3R**
Writing	**12**	**Grammar Intermediate: Sentence Transformation**
	13	**Common Errors in English**
	14	**Précis Writing**
	15	**Effective Paragraph Writing**

6TH SEMESTER

Approved Vide Agenda Item No. 03 of Minutes of Meeting of Academic Council held on 11 July 17

B-TECH ELECTRICAL ENGINEERING, SEMESTER –VI TEACHING & EXAMINATION SCHEME WITH EFFECT FROM JULY 2017													
SR NO	CODE	SUBJECTS	TEACHING SCHEME			CREDITS	HOURS	EXAMINATION SCHEME					
								THEORY			PRACT		TOTAL
								CIE		ESE	CIE	ESE	
			L	T	P			MID	IE				
1	EL0601	High Voltage Engineering	3	0	2	4	5	30	10	60	40	60	200
2	EL0602	Switchgear & Protection	4	0	2	5	6	30	10	60	40	60	200
3	EL0603	Electrical Drives & Control	3	0	2	4	5	30	10	60	40	60	200
4	EL0604	Electrical Machine Design I	3	2	0	4	5	30	10	60	00	00	100
5	EL0605	Advanced Control Theory (EL-I)	3	2	0	4	4	30	10	60	0	00	100
	EL0606	Industrial Automation (EL-I)											
	EL0607	Soft Computing Technique (EL-I)											
6	EL0608	Electrical Power Quality (EL-II)	3	2	0	4	5	30	10	60	00	00	100
	EL0609	EHV AC & DC (EL-II)											
	EL0610	Special machines (EL-II)											
	EL0611	MOOC Course (EL-II)											
7	SH0607	Advanced Technical Communication and Soft Skills	1	0	0	0	1	30	10	60	00	00	100
TOTAL			**21**	**04**	**06**	**25**	**31**	**210**	**70**	**420**	**80**	**120**	**900**

Approved Vide Agenda Item No. 03 of Minutes of Meeting of Academic Council held on 11 July 17

Subject: **High Voltage Engineering**								
Program: **B.Tech. Electrical Engineering**				Subject Code: EL0601			Semester: **VI**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	0	2	4	24/60	24/60	16/40	16/40	200

Course Outcome:

(Note: After completion of this course, the students are expected to ….

- Learn breakdown conduction in Liquid, Solid and Gases.
- Learn Measurement and Generation of High Voltage & Current.
- Testing of Materials and Electrical Apparatus.
- Also Learn Design of High Voltage Lab Layout

SYLLABUS

UNIT-I **[13]**

Generation of Various Types of High Voltages

Generation of High DC Voltages: Half Wave and full wave circuits –Ripple voltages in HW and FW rectifiers. Voltage doubler circuits – Simple voltage doubler, cascade voltage doubler. Voltage multiplier circuits – Crockroft Walton voltage multiplier circuits. Ripple and regulation. Electrostatic machines –principles –Van de Graff generator. Generation of high AC voltages: Cascade transformers, resonant transformers –parallel and series resonant test systems. Generation of high frequency high voltages – Tesla coil. Generation of impulse voltages – Standard impulse wave shape Basic circuits for producing impulse waves –Analysis of commercial impulse generator circuits – Wave shape control, multi-stage impulse generators – Marx circuit – modified Marx impulse generator circuit – Components of multi stage impulse generator. Generation of Switching surges. Generation of impulse current. Definition of impulse current waveform –Circuit for producing impulse current waves.

UNIT-II **[06]**

Measurements Of High Voltages & Currents

Measurement of high voltages and currents-DC,AC and impulse voltages and currents-DSO, electrostatic and peak voltmeters, sphere gaps-factors affecting measurements, potential dividers(capacitive and resistive)-series impedance ammeters, rogowski coils, hall effect generators.

UNIT-III **[12]**

Electrical Breakdown In Gases, Liquids & Solid Dielectrics

Introduction to Insulation materials. Breakdown in gas and gas mixtures-breakdown in uniform and non uniform fields, Paschens law, Townsends criterion, streamer mechanism, corona discharge, breakdown in electro negative gases, Breakdown in liquid dielectrics-suspended particle mechanism, Breakdown in solid dielectrics-intrinsic, streamer, thermal breakdown.

UNIT-IV **[14]**

Design, Planning And Layout Of Hv Laboratory

Test Facilities, Activities & Studies in HV lab, Classification of hv lab, Size & rating of hv lab, grounding of impulse testing laboratories.

HV Testing Of Electrical Apparatus

Non-destructive testing of dielectric materials – measurement dielectric constant and loss factor. Testing of Insulators, Bushings, Isolators, Circuit breakers, Cables, Transformers, Surge diverters, RI Measurement.

Text Book

1. E. Kuffel, W.S.Zaengl, J.Kuffel, " High voltage Engineering Fundamentals " , Newnes, 2nd edition,2002.
2. M. S. Naidu, V. Kamaraju, "High voltage Engineering", TMH, 2nd edition, 2001.

Reference Book

1. L. L. Alston, "High voltage Technology", BS Publications, 2007.
2. Nils Hylten-Cacallius, " High voltage Laboratory Planning, High voltage test system " , Asea Haefely.
3. "Standard techniques for high voltage testing", IEEE Publication 1978.
4. Relevant IS standards and IEC standards

Web Resource

nptel.ac.in/courses/108104048/

Laboratory Experiment List

1. To study of High voltage Laboratory.
2. To Determine the Dielectric Strength of Transformer Oil.
3. Determination of Breakdown Voltage for Different Types of Insulating Materials.
4. To Determine the Break down Characteristics of Air for Different shapes of Electrodes.
5. To Study the components, control and operation of 300kV, 3kJ Impulse Generator & Observe the Impulse Wave form on Digital Storage Oscilloscope.
6. Study of Horn Gap Type Lighting Arrester.
7. Testing of Pin type Insulator.
8. To Study the Effect of Movement of Impurities in Liquid Dielectric.
9. Electric Field Plotting using Electrolytic Tank.
10. To Understand Partial Discharge Measurement.

Subject: **Switchgear & Protection**								
Program: **B.Tech. Electrical Engineering**				Subject Code: EL0602			Semester: **VI**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
4	0	2	5	24/60	24/60	16/40	16/40	200

Course Objective: After completion of this course, expected outcome from the students,

- Students will know the operation, working applications of various switchgears and protective elements.
- Develop in students an ability and skill to design the feasible protection systems needed for each main part of a power system
- Students are knowledgeable in the field of various protection systems.

SYLLABUS

UNIT-I **[08]**

Switchgear And Neutral Grounding

Re-wirable fuses, HRC fuses, isolators and earthing switches, selection of fuses. Effectively grounded and ungrounded systems, resonant grounding Methods of neutral grounding.

Basic Principles And Ratings Of Circuit Breakers

Arc phenomenon, arc Interruption theories, arc control devices, recovery and restriking voltages, current chopping, Interruption of capacitive current, resistance switching, circuit breaker operating mechanism and control systems, making current, breaking current symmetrical and unsymmetrical, continuous current rating, MVA capacity.

UNIT-II **[09]**

Circuit Breakers

Arc controlled devices, ACB, ABCB, SF_6 circuit breaker, vacuum circuit breaker and DC circuit breakers, circuit breaker ratings, auto re-closer. Testing of circuit Breaker.

Functions of Protective Relaying

Fundamental characteristics of relays, standard definition of relay terminologies, relay

classifications, operating principles of single and double actuating quantity type electromechanical relays, directional relay, reverse power relay.

UNIT-III **[11]**

Transformer Protection

Protection of transformers, basic differential over current relays, restricted earth fault protection, gas relays, overall generator-transformer differential protection, magnetizing inrush protection

Generator & Motor Protection

Modern methods of protecting generators against faults in stator, rotor and prime movers and other abnormal conditions. Abnormal operating conditions, under voltage, phase and earthfault, overload and unbalanced voltage protections for motors.

UNIT-IV **[14]**

Busbar Protection: Protection of out door and indoor bus bar by current differential, voltage differential and directional comparison principles, linear coupler, high impedance schemes.

Transmission Line Protection: Operating characteristics of impedance, reactance relays on R-X diagram, overreach and memory action, ohm and mho types relays and their characteristics, relay response under power swings and effect of fault resistance, setting of distance relays.Carrier Current Protection-Phase comparison and directional comparison principles.

Solid state relays: Phase and amplitude comparators, duality between phase and amplitude comparators, general equation for comparators, realization of directional,ohm, reactance, impedance and mho characteristics using general characteristic equation, qualitative concepts of switched and non-switched scheme of static distance relays.

Introduction to Computer Aided Relaying: Introduction to microcomputer based relays, general functional diagram of microcomputer based relays.

Text Book:

1.M. A. Date, B.Oza, N.C. Nair, "Power System Protection", Bharti Prakashan,2004 2.J. Lewis Blackburn, "Protective Relaying", Marcel Dekker INC. 1997.

Reference Book

3.Russel Mason, "Art and Science of Protection relaying"

4.Allen Greenwood, "Electrical Transients in Power Systems", 1991.

5.Van. C. Warrington A.R., "Protective Relays Vol. 1 & 2", Chapman & Hall, 1998.

6.T S Madhav Rao, "Power system protection static relays with microprocessorApplications", Tata

McGraw hill Publication,1998.

7.Badri Ram, D N Vishwakarma, “Power System Protection and Switchgear”, Tata Mc Graw Hill, 2005.

8.Anderson P M, “Power System Protection”, IEEE publication, 1999.

9.Walter -Marcel Dekker, “Protective relaying theory and applications”, 2ed, Elmore, 2004.

Web resource

1. nptel.ac.in/downloads/108101039/

Laboratory Experiment List

1. Study of circuit breaker and its types
2. Study of testing of relay and circuit breaker
3. To perform the working of microcontroller based over current relay
4. To perform the working of microcontroller based 3 phase differential relay
5. To perform microcontroller based directional over current relay
6. To perform microcontroller based 1 phase differential relay
7. To perform microcontroller based reverse power relay.
8. To Study of various protective equipment used in substation.
9. To study the definite time and IDMT settings of microprocessor based over current relay test kit.
10. Simulation of Generator Differential Protection
11. Simulation of Transformer Differential Protection

Subject: **Electrical Drives & control**								
Program: **B.Tech. Electrical Engineering**				Subject Code: EL0603			Semester: **VI**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	0	2	4	24/60	24/60	16/40	16/40	200

Course Outcome:

After completion of this course, expected outcome from the students,

- Adjustable speed drive (ASD) or variable-speed drive (VSD) describes equipment used to control the speed of machinery.
- Understand the concepts of DC drive, AC drive and their control.
- Many industrial processes such as assembly lines must operate at different speeds for different products. Where process conditions demand adjustment of flow from a pump or fan, varying the speed of the drive may save energy compared with other techniques for flow control.

SYLLABUS

UNIT-I **[11]**

Fundamentals of Electric Drives: Electrical drives and introduction: Electric drives, advantages of electrical drives, parts of electrical drives, choice of electrical drives, status of ac and dc drives. types of load, load with translational motion, load with rotational motion, load torque that vary with time, Speed Sensing , and current Sensing.

Dynamics Of Electrical Drives: Fundamental torque equation, speed-torque convention and multi quadrant operation, , dynamics of motor load combination, nature and classification of load torque, measurement of moment of inertia, calculation of acceleration time in transient operation, acceleration time for specific nature of motor and load torque, load equalization, stability of electrical drives. Selection of Motor Power Rating.

UNIT-II **[07]**

Power Electronics Control of Dc Drives: Review of DC Motors and its performance, starting, braking, controlled rectifier fed DC drives with continuous and discontinuous mode of operation, Supply Harmonics, Power Factor and ripple in motor current, Chopper Controlled DC Drives, Sources current harmonics in chopper, Converter Ratings and closed loop control.

UNIT-III **[13]**

Power Electronics Control Of Ac Drives: Review of Three phase Induction Motor and its performance, starting, braking, Static Voltage control , Variable Frequency Control , voltage source inverter, current source inverter, Cyclo-converter based, static rotor resistance control and slip power recovery control schemes.

UNIT-IV **[14]**

Three Phase Synchronous Motors: Review of Three phase Synchronous Motor and its performance, Self controlled schemes, Variable frequency control of multiple synchronous motor, Permanent magnet AC motor drives, Brushless DC Motor Drives. Industrial Applications.

Text Book:

1. Dubey G.K, "Fundamentals of Electrical Drives", Narosa Publishing House, Second Edition, 2001.
2. Pillai S.K., "A First Course on Electrical Drives", New Age International , Second Edition, 2006.

Reference book

3. De N.K., Sen P.K. "Electric Drives", Prentice Hall of India, Second Edition , 2001.
4. Krishnan, R, "Electric Motor Drives: Modeling, Analysis and Control ", Prentice Hall of India, Second Edition , 2001.
5. Ned Mohan et al, "Power Electronics: Converters, Applications, and Design", John Wiley & Sons. Inc., 2nd Edition, 1995.
6. Werner Leonhard, "Control of electrical drives", Springer, 1995.

Web Resource

nptel.ac.in/courses/108104011/

Laboratory Experiment List

1. To study the operation of a DC Drive.

2. To study the operation of AC Drive
3. To study V/f control of Induction motor using IPM PEC16DSMO1 module & Micro-2407 trainer kit.
4. Develop a MATLAB program, to plot torque-speed characteristics of poly phase Induction motor.
5. Develop a MATLAB program, to plot torque-speed characteristics of stator voltage controlled induction machine.
6. Develop a MATLAB program, to plot torque-speed characteristics of Variable voltage variable frequency controlled induction machine.
7. Develop a MATLAB program to plot torque-speed characteristics of single phase half controlled rectifier fed separately excited DC machine.
8. Develop a MATLAB program to plot torque-speed characteristics of single phase fully controlled rectifier fed separately excited DC machine.
9. Analyze the speed control of DC motor drive in armature voltage control mode of operation using MATLAB Simulink
10. Analyze the open loop control of stator voltage control of induction motor drive using MATLAB Simulink.

Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	2	0	4	24/60		16/40		100

Course Outcome: (Note: After completion of this course, the students are expected to ….

- Study traditional methodologies for the analysis and the design of the electrical machines.
- Develop the knowledge about the calculation of total MMF in the machine and design of various electromagnets.
- Develop skills in designing various transformers and choke coils.
- Compare out power torque parameters for different size machine.
- Calculate the heat losses, core losses and mechanical losses of dc /induction/synchronous machine.

SYLLABUS

UNIT-I **[05]**

General Aspects

Insulating Materials & Classifications, heating of electrical machines , Cooling of Transformer and rotating machines , Electrical and Magnetic Loading ,output coefficient, factor affecting size of machines, selection of B av & ac, Duty cycle and equivalent ratings.

UNIT-II **[15]**

Transformer Design

Types of transformers, position of HV and LV windings, core and yoke cross sectional area, importance of mitered joints., Different types of transformers windings. Different methods for cooling of transformer, Different positions of tapings. Output equation for 3 phase transformers, window space factor, factors affecting window space factor. Relation between emf per turn and transformer rating, factors affecting constant K, stacking factor, examples. Selection of flux density and current density, Window dimensions, Yoke dimensions and overall core dimension calculations, examples. Design of HV and LV windings (No. of turns and area of cross section).

Estimation of operating characteristics. Primary and secondary winding resistance. Leakage reactance calculation of only cylindrical coil with equal height, Leakage reactance of unequal windings and heights, only formula. No load current calculations for 3 phase transformers. Temperature rise of transformer, design of tank with tubes, calculation of dimension of tank, examples. Optimum design Design for minimum cost. Design for minimum loss. Variation of output and losses in transformer with linear dimensions. Dry transformer, high frequency transformer.

UNIT-III **[20]**

Design of DC machine

Introduction, output equation, mmf calculation Selection of Number of poles, core length, armature diameter, Carter's fringing curves, length of air gap, examples on above topics costing.

Armature Design

Choice of armature winding, armature conductor, number of armature slots, slot dimensions, slot loading, design of armature core, Problems on above topics, costing.

Design of Field System

Pole design, design of field winding of shunt, series and compound machines, examples Design of interpole, effects and minimization armature reaction Design of Commutator and brushes, Improvement in commutation, Performance calculation & Design consideration for large machines, HV machines and miniature DC motors.

UNIT-IV **[05]**

Design of Current Transformer

Introduction, construction Design principles OF C.T & P.T. , winding design, Behavior of transformer under normal and abnormal condition.

Text Books:

1. Sawhney, A.K. "A Course in Electrical Machine Design", DhanpatRai and Sons, New Delhi.
2. Sen, S.K., "Principles of Electrical Machine Design with Computer Programmes," Oxford and IBH Publishing Co. Pvt Ltd., New Delhi, 1987.

Reference Book

3. Upadhyay, K.G., "Design of Electrical Machine," New Age International Publishers, New Delhi.

4. V.N.Mittle & A.Mittal."Design of Electrical Machines"Standard Publishers Distributors, Delhi-32.

Web Resource

www.bookspar.com

Program: **B.Tech. Electrical Engineering**				Subject Code:EL0605			Semester: **VI**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	2	0	4	24/60	0	16/40	0	100

Course Outcome:

After learning this course, the students should be able to:

1. Carry out modeling of discrete systems in state space
2. Evaluate programming strategies in the domain of control systems
3. Design modern control systems with computer simulation

SYLLABUS

UNIT-I **[12]**

Discretization of continuous systems, sampling theorem, z transform, zero order hold, convert transfer function, continuous to discrete domain, mapping between s and z domain, stability criteria in z- domain. Effect of sample time on systems stability. Root locus for discrete time systems stability.

UNIT-II **[12]**

Converting of continuous time state space systems to discrete time state space, State space analysis and design of discrete time systems, stability in state space, design of state feedback controller, state observer design. Digital implementation of PID controller

UNIT-III **[12]**

Introduction to nonlinear systems. Types of common nonlinearities, Stability of nonlinear systems, describing functions analysis, limit cycles, phase plane analysis, phase trajectories.

UNIT-IV **[12]**

Introduction to Multivariable Systems, interaction and decoupling, Relative Gain Array, stability of multivariable systems. Two degree of freedom controller design for SISO system in continuous and discrete domain.

Text Books:

1. Discrete Time Control Systems by K. Ogata, PHI

2. Modern Control Engineering by K.Ogata, 2nd edition, PHI

Reference Book

3. Fuzzy Logic with engineering applications by Timothy Ross, Wiley, 2010

4. Digital Control & State variable methods by M. Gopal, Tata MC Graw Hill, 2003.

5. Digital Control Systems by Kuo, 2nd edition, Oxford

6. Process Systems Analysis and Control by Donald Coughanowr, MC Graw Hill, 2nd edition, 1995

7. Digital Control by R Kannan Moudgalya, Wiley India

Web Resource

1. folk.ntnu.no/skoge/presentation/plantwide-course.../Hovd-Kompendium-2010.pdf
2. nptel.ac.in/courses/101108047/module1/Lecture%201.pdf

Subject: **Industrial Automation**								
Program: **B.Tech. Electrical Engineering**				Subject Code: EL0606			Semester: **VI**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	2	0	4	24/60	0	16/40	0	100

Course Outcome: After completion of this course, expected outcome from the students,

1. Learn the Automation using PID, DCS, and SCADA.
2. PLC hardware and software to do automation in Industries**.**

Unit-1 **[10]**

General Concepts: General concepts of the industrial production. Concepts of production systems and production processes. Automation production systems and their classification. **Process Control Loop and its Characteristic:** Controlled variable, controlling parameters, process equation load, transient, process, lag, self-regulation, control lag, variable range, dead time, cycling.

Unit-2 **[10]**

Control Algorithms: Characteristic of different discontinuous controller mode, two position mode, multi position mode, floating control mode, introduction of different continuous controller mode, proportional, integral, derivative, PI, PID controller mode.

Unit-3 **[15]**

Programmable Logic Controller (PLC): Architecture by block diagram, i/o modules & programming criteria-discrete state process control, analog controller, digital controller, and intelligent controller, serial communication port. Memory and storage, programming language-ladder diagram and its application.

Unit-4 **[10]**

Distributed Control System: Evaluation of DCS, system architecture-hierarchical of DCS at function levels, Database organization, system implementation concepts System elements- fields, station, intermediate station, central computer system, Monitoring and communication facilities, data communication linktransfer of process data, SCADA.

Text Book:

1. Johnson, C. D., "Process Control Instrumentation Technology", Prentice Hall.
2. Liptak, B. G., "Instrument Engineers – Handbook", (Vol. – II), CRC Press.
3. Morriss, S. B., "Programmable Logic Controllers", Prentice hall.

Text Books:

1. Webb, J. W., and Reis, R. A., "Programmable Logic Controllers: Principles & Applications", Prentice Hall, (2002).
2. Shinskey, F. G., "Process Control Systems: Application, Design and Tuning", McGraw-Hill Professional, (1996).

Reference Book

3. Thomas E. Marlin, "Process Control: Designing Processes and Control for Dynamic Performance", McGraw – Hill, International Edition
4. Dale E. Seborg, Thomas F. Edger, Duncan A. Mellichamp, "Process Dynamics and Control", Wiley India.
5. SurekhaBhanot, "Process Control: Principles and Applications", Oxford University Press.
6. Peter Harriot, " Pocess Control", Tata - McGraw Hill.
7. Patranabis, "Principles of Process Control", Tata - McGraw Hill.

Web Resource

1. nptel.ac.in/downloads/108105063/
2. nptel.ac.in/courses/.../Industrial%20Automation%20control/New_index1.html

Subject: **Soft Computing Technique**								
Program: **B.Tech. Electrical Engineering**				Subject Code: EL0607			Semester: **VI**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluatin (CIE)- Practical**	**Total**
3	2	0	4	24/60	00	16/40	00	100

Course Outcome:

(Note: After completion of this course, the students are expected to ….

- To provide adequate knowledge about feedback neural networks.
- To teach about the concept of fuzziness involved in various systems.
- To expose the ideas about genetic algorithm
- To provide adequate knowledge about of FLC and NN toolbox

SYLLABUS

UNIT-I **[12]**

Genetic Algorithms

Goals of optimization, comparison with traditional methods, schemata, Terminology in GA – strings, structure, parameter string, data structures, operators, coding fitness function, algorithm, applications.

UNIT-II **[12]**

Fuzzy Logic

Concepts of uncertainty and imprecision, sets, concepts, properties and operations on classical sets & fuzzy sets, classical & fuzzy relations, membership functions, fuzzy logic, fuzzification, fuzzy rule based systems, fuzzy propositions, and applications.

UNIT-III **[12]**

Artificial Neural Networks

Basics of ANN: Models of a Neuron, Topology, Multi Layer Feed Forward Network (MLFFN), Radial Basis Function Network (RBFN), Recurring Neural Network (RNN), learning processes: supervised and unsupervised learning. error-correction learning, Hebbian learning; single layer

perceptrons, multilayer perceptrons, least mean square algorithm, back propagation algorithm applications.

UNIT-IV **[06]**

Hybrid System

Fuzzy Neural systems, ANFIS application, Genetic Fuzzy systems, Genetic Neural systems.

Text Books

1. Timothy J.Ross, Fuzzy Logic with Engineering Applicatios, McGraw-Hill

2. Neural Networks, Fuzzy Logic And Genetic Algorithm: Synthesis And Applications by S. Rajasekaran, G. A. Vijayalakshmi Pai

3. J.M. Zurada, .Introduction to artificial neural systems., Jaico Publishers

Reference Book

4. H.J. Zimmermann, Fuzzy set theory and its applications., III Edition, Kluwer Academic Publishers, London.

5. Suran Goonatilake, Sukhdev Khebbal (Eds), .Intelligent hybrid systems., John Wiley & Sons, New York, 1995

6. Goldberg, D. E, Genetic algorithm in search, optimization and machine learning,Addison-Wesley, Reading Mass.

7. Kalyanmoy Deb, Optimization for Engineering Design – Algorithms and examples, PHI, New Delhi, ISBN-81-203-0943-x.

8. Simon Haykin, Neural Netwroks, PrenticeHall

Web Resource

1. https://lecturenotes.in/subject/124/soft-computing
2. users.du.se/~jwe/fuzzy/NFL/F9.PD

Subject: **Electrical Power Quality**								
Program: **B.Tech. Electrical Engineering**				Subject Code: EL0608			Semester: **VI**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	2	0	4	24/60		16/40		100

Course Outcome:

After learning the course the students should be able to:

1. Comprehend concept of Power Quality & it's issues for various electrical systems
2. Identify sources of harmonics and understand their effects on power system components
3. Know different techniques for power quality monitoring.

SYLLABUS

UNIT-I **[12]**

Introduction to Power Quality

Definition of power Quality, power quality terminology, power quality issues, Susceptibility Criteria, Responsibility of supplier and users of elect power, Standards.

Power Frequency Disturbance

Common power frequency disturbances, voltage sags, cures of low frequency disturbances, voltage tolerance.

Electrical T \ ransients: Transient system model, Examples of models & response, Types and causes of transients, Examples of transient wave formsTransient system model, Examples of models & response, Types and causes of transients, Examples of transient wave forms.

UNIT-II **[12]**

Harmonics

Definition , number, odd and even harmonics, causes of harmonics, Individual & total distortion, Harmonics signatures, Effect of harmonics, Guide lines for harmonic voltage & current limitation, Harmonic current mitigation.

Grounding & Bonding

Introduction, National electric code grounding requirements, Essentials of grounding system, Ground electrodes, Earth resistance tests, Earth ground grid system, Power Ground system, Signal reference ground, Signal reference ground methods, Single and multi-point grounding, Ground loops.

UNIT-III **[09]**

Power Factor

Introduction, Active and Reactive power, Displacement and true power factor, power factor improvement, correction, penalty, voltage rise due to capacitance, application of synchronous condensers and static VAR compensators

Electromagnetic Interference

Electric and magnetic fields, Electromagnetic interference terminology, Power frequency fields, High frequency interference, EMI Mitigation, Cable shielding to minimize EMI, Health concerns of EMI.

UNIT-IV **[12]**

Power Quality Measurement

Power quality measurement devices, power quality measurements, Number of test locations, Test duration, Instrument setup, Instrument set up guidelines.

Distributed Generation and Power Quality

Resurgence of DG, DG technologies, Interface to the utility system, Power quality issues, Operating conflicts,

Text Books

1. Power Quality by C.Sankaran, CRC publication

Reference Book

2. Electrical Power Systems Quality by Roger C.Dugan , TMH publication

3. Harmonics and Power Systems by Francisco C. De La Rosa, CRC Publication

Web Resource

lecturenotes.in/topic/472/electrical-power-quality/power-quality-monitoring/

nptel.ac.in/courses/108106025/

Subject: **EHV AC & DC**								
Program: **B.Tech. Electrical Engineering**				Subject Code: EL0609			Semester: **VI**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	2	0	4	24/60		16/40		100

Course Outcome:

Elicit the advantages of EHV AC transmission systems. Mould students to acquire knowledge about HVDC Transmission systems. This course gives idea about modern trends in HVDC Transmission and its application, Understand about the overvoltage and its effects on power system. Complete analysis of harmonics and basis of protection for HVDC Systems.

SYLLABUS

UNIT-I **[14]**

HVDC POWER TRANSMISSION

Comparison of AC and DC Transmission, Application of DC transmission, types of DC links, recent trends.

ANALYSIS OF HVDC CONVERTERS

Three phase and six phase converter circuits, voltage current waveforms and ratios, apparent power factor and utilization factor, delay angle, transformer rating pulse number, commutation group, Graetz Circuit, Overlap, advance angle and extinction angle, analysis of two and three valve conduction mode, equivalent commutation resistance, reactive power requirements of HVDC converters.

UNIT-II **[12]**

CONTROL OF HVDC CONVERTERS

Power flow in HVDC transmission system, constant ignition angle control, constant extinction angle control, constant current control, actual control characteristics.

EHV AC TRANSMISSION LINES

Introduction, calculation of line and ground parameters, bundled conductors, bundle spacing and bundle radius, sequence inductance and capacitance parameters, line parameters for modes of propagation, digitalization procedure, interpretation of eigen vectors, Resistance and Inductance of ground return.

UNIT-III **[09]**

VOLTAGE GRADIENT OF CONDUCTORS

Field of a point charge and its properties, field of a sphere gap, method of image charges, field of line charges and their properties, corona inception gradient, charge potential relations for multi-conductor lines, maximum charge condition on a three phase line. Surface voltage gradients on conductors: single conductor, 2 conductor and multi conductor bundle, maximum surface voltage gradient, Mangoldt (Markt-Mengle) formula, design of cylindrical cage for corona experiments, single conductor concentric as well with eccentricity inside a cylinder.

UNIT-IV **[10]**

CORONA EFFECT

Power loss: Corona loss formulas, attenuation of traveling waves due to corona losses. Audible noise: generation and characteristic, formula for audible noise. Radio interference: The CIGRE formula, measurement of RI and RIV.

SWITCHING OVER VOLTAGE

Origin of over voltages and their types, over voltages due to interruption of low inductive current and interruption of capacitive currents, Reduction of switching surges on EHV systems.

Design of HVDC Transmission Lines

Introduction, Limitations of high voltage a.c. transmission, Advantaged and limitations of HVDC transmission, Principle of control of HVDC transmission, Applications of HVDC system.

Text book

1. E W Kimbark, “Direct current Transmission”, Vol. I, Wiley Interscience.
2. J. Arrillaga, “High Voltage Direct Current Transmission”, Peter Peregrines.

Reference Book

1. KR Padiyar, " HVDC Power Transmission Systems " , New Age International (P) Ltd., Publishers, 3rd Edition.
2. Begamudre, "EHV AC Transmission engineering", Wiley Easter Ltd. 2nd Ed.
3. Edison Electric Institute, "EHV transmission reference book", GE Co.
4. EPRI, Palo Alto, "Transmission line reference book 345 KV & above".

Web Resource

1. https://2ee428sg.wordpress.com/nptel-course/
2. notes.specworld.in › education

Subject: **Special Machines**								
Program: **B.Tech. Electrical Engineering**				Subject Code: EL0610			Semester: **VI**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	2	0	4	24/60		16/40		100

Course Outcome:

- The student will be able to identify machines for different applications.
- The student will understand the working and application of different machines.

SYLLABUS

UNIT-I **[13]**

SERVO MOTORS

Symmetrical components applied to two - phase servo motors - equivalent circuit and performance based on symmetrical components - servo motor torque - speed curves.

VARIABLE RELUCTANCE MACHINES

Basics of VRM analysis, Practical VRM configurations, current waveforms for torque production, non-linear analysis.

UNIT-II **[11]**

STEPPER MOTORS

Construction features - method of operation - drive - amplifiers and transistor logic - half stepping and the required switching sequence - the reluctance type stepper motor - ratings and other characteristics.

RELUCTANCE MOTORS

General - types of synchronous motors - reluctance - motors - definitions – construction polyphase and split phase reluctance motors - capacitor type reluctance motors.

HYSTERISIS MOTORS

Construction - polyphase - capacitor type and shaded pole hysteresis motors

UNIT-III **[11]**

UNIVERSAL MOTORS

Application and torque - characteristics - essential parts of universal motor.

LINEAR MACHINES

Basic difference between LEMS and rotating - machine - classification of LEMS linear motors and levitation machines - linear induction motors – linear synchronous motors - DC linear motors - linear levitation machines.

UNIT-IV **[10]**

PMDC MOTORS

Construction, principle of operation, performance analysis.

BRUSHLESS DC MOTORS

Construction, principle of operation, phasor diagram, characteristics, performance analysis.

Text Book

1. Toro. V. D, "Electric machines and power systems", Prentice Hall of India, 1985
2. Veinott,"Fractional horse power electric motors", Mc Graw Hill, 1948.

Reference Book

3. Nasar. S. A, Boldeal, "Linear Motion Electric machine", John Wiley,1976
4. Athani, "Stepper Motors", New Age International PUB 1997.
5. Fitzgerald, Kingsley & Umans, "Electric Machinery", TMH 2003.
6. Kothari & Nagrath, "Electric Machines", TMH 2004.

Web Resource

nptel.ac.in/courses/108105017

Subject: **Advanced Technical Communication And Soft Skills**								
Program: **B.Tech. Electrical Engineering**			Subject Code: SH0607			Semester: **VI**		
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
1	0	0	0	60	00	40	00	100

	Sr. No.	Content
Speaking	1	Vocabulary Games: Advanced Level
	2	Role Play 1
	3	Role Play 2
	4	Role Play 3
	5	Selected speeches & Songs: Declamation 1
	6	Selected speeches & Songs: Declamation 1
	7	Report Presentation Seminar
	8	Report Presentation Seminar
	9	Report Presentation Seminar
	10	Interview Skills (Mock Interview Sessions 2)
Writing	11	Writing Reports
	12	Making Proposals
	13	Resume Building
	14	Letter, Email application

Reference Books:

1. Fred Luthans, Organizational Behaviour, McGraw Hill
2. Lesikar and petit, Report writing for Business
3. M. Ashraf Rizvi, Effective Technical Communication, McGraw Hill
4. Wallace and masters, Personal Development for Life and Work, Thomson Learning
5. Hartman Lemay, Presentation Success, Thomson Learning
6. Malcolm Goodale, Professional Presentations

7. Farhathullah, T. M. Communication skills for Technical Students
8. Michael Muckian, John Woods, The Business letters Handbook
9. Herta A. Murphy, Effective Business Communication
10. Lehman, Dufrene, Sinha BCOM, Cengage Learning

Web resources/ MOOCs:

Introduction to English Language & Literature Mod-1 Lec-1
https://www.youtube.com/watch?v=xC3M9EqduyI

The English Language Mod-1 Lec-
https://www.youtube.com/watch?v=HsR4jFszFdw#action=share

International English Mod-1 Lec-4
https://www.youtube.com/watch?v=FT4cQkXCc8g

Effortless EnglishRule-1 English Phrases:
https://www.youtube.com/watch?v=r5z-lilm-gg

Pronunciation Training Techniques:
https://www.youtube.com/watch?v=wB8mr4iViy0

Make Body Language Your Superpower:
https://www.youtube.com/watch?v=wB8mr4iViy0

English Job Interviews | Best Answers to Questions:
https://www.youtube.com/watch?v=wB8mr4iViy0

7TH SEMESTER

Approved Vide Agenda Item No. 03 of Minutes of Meeting of Academic Council held on 11 July 17

B-TECH ELECTRICAL ENGINEERING, SEMESTER –VII TEACHING & EXAMINATION SCHEME WITH EFFECT FROM JULY 2017														
SR NO	CODE	SUBJECTS	TEACHING SCHEME			CREDITS	HOURS	EXAMINATION SCHEME						
								THEORY			PRACT		TOTAL
								CIE					
			L	T	P			MID	IE	ESE	CIE	ESE	
1	EL0701	Power System Design	3	0	2	4	5	30	10	60	40	60	200
2	EL0702	Power System Operation & Control	3	2	2	5	7	30	10	60	40	60	200
3	EL0703	Electrical Machine Design II	3	2	0	4	5	30	10	60	00	00	100
4	EL0704	Testing & Commissioning of Electrical Equipment	3	0	2	4	5	30	10	60	40	60	200
5	EL0705	Energy Management & Audit	3	2	0	4	5	30	10	60	00	00	100
6	EL0706	Flexible AC Transmission System (EL-III)	3	2	0	4	5	30	10	60	00	00	100
	EL0707	Advanced Power Electronics & Applications (EL-III)											
	EL0708	Power System Planning (EL-III)											
	EL0709	MOOC Course (EL-III)											
7	CV0712	Disaster Management	01	00	00	00	01	30	10	60	00	00	100
TOTAL			**19**	**08**	**06**	**25**	**33**	**210**	**70**	**420**	**120**	**180**	**1000**

Approved Vide Agenda Item No. 03 of Minutes of Meeting of Academic Council held on 11 July 17

Subject: **Power System Design**								
Program: **B.Tech. Electrical Engineering**				Subject Code: EL0701			Semester: **VII**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	0	2	4	24/60	24/60	16/40	16/40	200

Course Outcome: (Note: After completion of this course, the students are expected to ….

- Study traditional methodologies for the analysis and the design of the electrical power system.
- Develop the knowledge about the calculation of electrical and mechanical design of transmission line.
- Develop skills in designing of distribution system, designing of sub station.
- Devlope designing approach in power system improvement & planning for the field of power system design.

SYLLABUS

UNIT-I **[11]**

Transmission Line Design

Electrical design of transmission line, Design philosophy, voltage level selection and choice of conductors, spacing of conductor and corona, insulators and SIL, design problem. Mechanical design of transmission line Considerations, loading on conductors, span, sag and tension clearance, stringing, problems. Transmission line tower design, Location of tower, Earth wires, Reduction of tower footing resistance, examples.EHV Transmission Line DesignConsiderations, selection, spacing of conductors, corona and radio interference, shunt and series compensation, tuned power lines, insulation coordination and different types of EHV towers, EHV systems in India.

UNIT-II **[11]**

Design of Distribution System

Types of distribution systems, arrangements, selection and size of feeders using Kelvin's law, design of cables in distribution systems considering ampere capacity, voltage drop during starting and running load, primary distribution design, secondary distribution design, Distribution

substation, Calculation of distributor size and its examples, calculation of voltage drops and size of distributor, Voltage regulation and lamp flicker, Design of rural distribution, Planning and design of town electrification scheme, Design of industrial distribution system. Economics Of Distribution System**:** Comparison of overhead-transmission and distribution system, Effect of voltage, Selection of equipment, Economic size of power apparatus, Economic selection of distribution system, Power transmission and distribution cost, Energy losses in distribution system

UNIT-III **[13]**

Design of Substation

Substation layout, selection of sizes and locations of sub stations, Substation equipments specifications ratings and its operation from design view point, selection of size and location of generating stations, Interconnection. Package substation concept, conversion of overhead to underground distribution system.

UNIT-IV **[10]**

Power System Earthing

Objectives, Definitions, Tolerable limits of body currents, Soil resistivity, Earth resistance, Tolerable step and touch voltage , Actual Touch and step voltages, Design of earthing grid, Tower footing resistance, Measurement of soil resistivity and earth resistance, Impulse behavior of earthing Systems, Neutral earthing, Eco-friendly earthing/chemical earthing

Text Book:

1. Electrical Power System Design :M. V. Deshpande, TMH publication
2. Electrical Power System Design :B. R. Gupta, S. CHAND

Reference Book

3. A course in Electrical Power: Soni,Gupta and Bhatnagar, DhanpatRai& Sons
4. Substation Design: Satnam& Gupta, DhanpatRai and Co.
5. Electrical Power System Planning A. S. Pabla, TMH publication

Web Resource

https://www.vssut.ac.in/lecture_notes/lecture1424265031.pdf

Subject: **Power System Operation & Control**								
Program: **B.Tech. Electrical Engineering**				Subject Code: EL0702			Semester: **VII**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	2	2	5	24/60	24/60	16/40	16/40	200

Course Objective: After completion of this course, expected outcome from the students,

- Learn the Economic Operation of power system.
- Learn Load Voltage and frequency control.
- Learn power system security and optimal power flow.

SYLLABUS

UNIT-I **[09]**

Load Flow Studies

Network model formulation, Bus Incidence matrix, formation of Y bus, Y Bus Algorithm, power flow problem, different types of buses, approximate power flow, Gauss Seidel method, Algorithm, Flow chart, Newton-Raphson method, NR algorithm, Decoupled Power flow studies, Fast Decoupled power flow studies comparison of power flow methods.

UNIT-II **[10]**

Economic Load Dispatch

Economic dispatch of thermal units and methods of solution, Transmission losses, B matrix loss formula, Composite generation production cost function-solution by gradient search techniques, Nonlinear function optimization

Unit Commitment

Constraints in Unit commitment, Spinning reserve, Thermal and hydro constraints, Unit commitment solution methods-Priority list methods, Dynamic programming solution.

UNIT-III **[09]**

Automatic Generation Control

Governor characteristic Single area load frequency control, speed governing system and

characteristics, Multi area load frequency control; flat frequency, flat tie-line load and tie-line load bias control, Economic Dispatch and AGC, EMS, SCADA.

Methods Of Voltage Control

Reactive power and its relation to voltage control, location of voltage control equipment, methods of voltage control, excitation control, voltage regulators, tap changing transformers, booster transformers, induction regulators, reactive power injection and voltage control by synchronous condenser.

UNIT-IV **[12]**

Power System Stability

Introduction, dynamics of a synchronous machine, power angle equation-swing equation, power angle curve, simple systems, steady state stability, condition of steady state stability, transient stability, equal area criteria- Sudden change in Mechanical input, effect of clearing time on stability, sudden loss of one of parallel lines, sudden short circuit on one of parallel lines, numerical solution of swing equation, some factors affecting transient stability.

Power System Security

Factors affecting power system security, Contingency analysis: Detection of network problems, Correcting the generation approach: Sensitivity factors.

Text Book

1. A. J. Wood and B.F. Wollenberg, "Power Generation Operation and Control", John Wiley & Sons, ICN., 2nd Edition.

Reference Book

2. A. K.Mahalanabis, "Computer Aided Power system analysis and control", Tata McGraw Hill 1991
3. O. I. Elgerd, "Electric Energy Systems Theory", McGraw Hill, 2nd Edition, 1982,Dec
4. Stevenson J V, William D, "Elements of Power System Analysis", McGraw Hill, 1988.
5. I. J. Nagrath & D.P. Kothari, "Modern Power System Analysis", Tata McGraw Hill,1989

Web Resource

ptel.ac.in/downloads/108101040/

Laboratory Experiment List

1. To Perform load flow analysis using GS method
2. To Perform load flow analysis using NR method.
3. To perform AC load flow analysis.
4. To perform Economic load dispatch using B-coefficient method.
5. To perform short circuit analysis.
6. To perform LG fault analysis.
7. To perform load frequency control using flat frequency control.
8. To perform load frequency control using Tie line frequency control.
9. To perform contingency analysis for line outage.
10. To perform contingency analysis for Generator outage.

Subject: **Electrical Machine Design-II**								
Program: **B.Tech. Electrical Engineering**				Subject Code: EL0703			Semester: **VII**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	2	0	4	24/60		16/40		100

Course Objective: After completion of this course, expected outcome from the students,

- Learn the Economic Operation of power system.
- Learn Load Voltage and frequency control.
- Learn power system security and optimal power flow.

SYLLABUS

UNIT-I **[11]**

Induction motor design

Output equation, choice of specific scheme, separation of D & L, peripheral Stator winding design, Calculation of no. of turns per phase, conductor's area shape of the stator slots, factors to be considered while deciding no of stator slots, Area of stator slots, stator winding resistance, stator teeth design, depth of the stator core, examples related to above topics, Length of the air gap. Rotor design A. Squirrel cage rotor – selection of no. of rotor slots, harmonic induction torque. Harmonic synchronous torque, vibration and noise, voltage ripples, rules for selecting no. of rotor slots, Methods for reducing harmonic torque, design of rotor bars and slots, calculation of rotor bar current, area of rotor bars, shape of rotor slots, examples, Design of end rings, Calculation of end rings current, cross-sectional area of end rings.

UNIT-II **[11]**

Design of wound rotor

Calculation of number of rotor slots, no. of turns, cross sectional area of rotor conductors, types of rotor windings, check for rotor tooth density, design of rotor core, examples Estimation of operating characteristics- no load current calculation, short circuit current calculation, stator and rotor resistance and reactance calculation, examples, circle diagram, Dispersion coefficient – effect

on maximum output power factor. Performance calculation, Design aspects for large size machine, high voltage m/c, High speed m/c, algorithm and flow chart Design of submersible motors.

UNIT-III **[13]**

Design of single phase induction motor

Types of motors, Design of main dimensions, design of stator, Design of rotor, calculation of operating characteristic (rotor resistance, stator resistance, iron loss, friction and windage loss etc, Design of auxiliary winding, starting torque, circle diagram, design of capacitance for maximum torque.

UNIT-IV **[10]**

Synchronous machine design

Introduction, output equations, Main dimension, SCR, effect of SCR on machine performance Length of air gap and shape of pole face Armature design, Armature winding (Single layer and double layer), number of armature slots, slots dimension, length of mean turns, calculation of armature resistance and reactance Design of rotor , Design of magnetic circuit, Open circuit characteristic Determination of full load field MMF, Design of field winding Determination of direct and Quadrature axis synchronous reactance Short circuit characteristics, Performance evaluation Design of Turbo alternators, Main dimension, Length of air gap, Stator & Rotor design Algorithms and Flow chart Design consideration for low speed alternators and vertically operated alternator.

Test Book

1. A COURCE IN Electrical Machine Design, A K Sawney, Dhanpat Rai and Sons.

Reference Book

2. Electrical machine Design- R K Agarwal, S K kataria & Sons.

Subject: **Testing & Commissioning of Electrical Equipment**								
Program: **B.Tech. Electrical Engineering**				Subject Code: EL0704			Semester: **VII**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	0	2	4	24/60	24/60	16/40	16/40	200

Course Outcome:

- Learn the Transformer &Induction Motor Testing.
- Learn Sub Station Equipments & Commissioning of Transmission Line& Cable.

SYLLABUS

UNIT-I **[08]**

Transformer

Testing procedure for HV testing ,Phase shifting/ phase group , Radio interference, Ratio Test , Load loss ,Separate source voltage testing ,Induced voltage testing , Impulse & Surge testing , Noise level & vibration testing , Short circuit withstand test ,Tan Delta test , Core insulation voltage test, Measurement of impedance ,Testing of auxiliaries & safety device , Oil testing , Classification of testing methods , Testing of bushing. DC & AC Resistance measurement, Temp. Rise test, Short circuit test, Dielectric test, Partial discharge, Insulation resistance testing. Polarity testing, Short time current rating, Impulse & surge testing, Determination of error & accuracy class, Power frequency voltage withstand test, over voltage inter-turn test. Determination of polarization index for transformer. Drying out procedure for transformer. Commissioning steps for transformer, Purification & Filtration Procedure for Transformer oil. Troubleshooting & Maintenance of transformer.

UNIT-II **[13]**

Induction Motor Testing (3-phase & 1-phase)

Hammer test, Testing against variation of voltage/current/frequency, Load test, NL & BR test, DC & AC, Resistance measurement, Insulation measurement, Starting test, Temp. Rise test, Slip

measurement, HV test, Testing on auxiliaries, Vibration Test, Noise level test. Drying out methods / Polarization Index / Hot Temperature measurement Degree of protection (IP Grade) Commissioning steps for Induction motor, Heat Run Test. Commissioning of Induction Generator. Troubleshooting & maintenance of induction motor.

DC Machines

Testing Voltage drop test or bar to bar test, Load test, Open circuit & magnetizing test, Insulation resistance, Starting performance, Dielectric test. Swinburne ' s test, Hopkinson's test, Field test, Separation of losses in DC shunt machine. Temp. rise test & Heat run test Drying out process Commissioning steps for DC machines Troubleshooting & maintenance.

UNIT-III **[12]**

Substation Equipments

Bus bar Temp. Rise test, Rated short time current test, HV test, Power frequency voltage withstand test, Impulse / surge testing, Vibration. Earthing Earthing resistance measurement, Substation grid Earthing, Soil resistivity measurement. Isolator Testing Temp. Resistance test, Short circuit test, Charging current making & breaking test, Inductive current making & breaking test.

Circuit breaker: Testing of HV/LV circuit breaker

No load Mechanical Operation, Mechanical endurance test, Temp. Rise test, Impulse & surge testing, short time current test. Short circuit making & breaking test, Line Charging current making & breaking test, Cable charging & capacitor bank making & breaking test, Out of phase switching, Short line fault test, and Electrical & Mechanical endurance test for LT switch gear like MCB / MCCB /ELCB etc. C.T. & P.T. Testing, Relay testing, Coupling capacitors, Station Batteries for D.C. Supply, Fire Shifting Equipments. Testing & Commissioning of Lightning Arrestor, Substation Commissioning by Thermograph. Troubleshooting & maintenance of circuit breakers.

UNIT-IV **[12]**

Synchronous machine: Testing

OC & SC test, Characteristics, Loss measurement, Temp. rise test , Over speed test , HV testing , Insulation resistance wave form interference , DC & AC Resistance of armature & field winding measurement , Dielectric testing on armature & field winding , Mechanical balance , Magnetic balance , Current balance , Phase sequence.

Commissioning of transmission line & Cable

Derating of cable capacity, HV test, AC & DC Resistance check, Insulation resistance, Impedance measurement, Location finding technique for fault in underground cables (Murray loop test & Warley loop test), Testing of open circuit faults in cables. Line charging, loading & Dropping.

Text Books

1. Testing, Commissioning & maintenance of electrical equipment By S. S. Rao, khanna publications

Reference Book

2. The commissioning of Electrical Plant by RCH Richardson (Chapman & Hall)

Subject: **Energy Management and Audit**		
Program: **B.Tech. Electrical Engineering**	Subject Code: EL0705	Semester: **VI**
Teaching Scheme	**Examination Evaluation Scheme**	

Lecture	Tutorial	Practical	Credits	University Theory Examination	University Practical Examination	Continuous Internal Evaluation (CIE)- Theory	Continuous Internal Evaluation (CIE)- Practical	Total
3	2	0	4	24/60		16/40		100

Course Outcome:

- To study the concepts behind economic analysis and load management.
- To emphasize the energy management on various electrical equipments and metering
- To illustrate the concept of lighting systems and cogeneration.

SYLLABUS

UNIT-I **[11]**

Introduction

Need for energy management – energy basics – designing and starting an energy management program – energy accounting – energy monitoring, Targeting and reporting-energy audit Process.

UNIT-II **[12]**

Energy Cost and Load management

Important concepts in an economic analysis–economic models–time value of money –utility rate structures – cost of electricity –loss evaluation. Load management: demand control techniques – utility monitoring and control system-HVAC and energy management – economic justification.

UNIT-III **[10]**

Energy audit for motors, Systems and Electrical Equipments

Systems and equipment – electric motors – transformers and reactors – capacitors and synchronous machines.

UNIT-IV **[12]**

Metering For Energy Management

Relationships between parameters –Units of measure–typical cost factors – utility meters – timing of meter disc for kilowatt measurement – demand meters – paralleling of current transformers–

instrument transformer burdens –Multitasking solid-state meters – metering location vs. requirements –Metering techniques and practical examples.

Text Books

1. Eastop T.D, Croft D.R, "Energy Efficiency for Engineers and Technologists", Logman Scientific &Technical, 1990.

Reference Book

2. Reay D. A. "Industrial Energy Conservation", first edition, Pergamon Press, 1977.
3. IEEE Recommended Practice for Energy Management in Industrial and Commercial Facilities, IEEE, 1996.

Subject: **Flexible AC Transmission System**								
Program: **B.Tech. Electrical Engineering**				Subject Code: EL0706			Semester: **VII**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	2	0	4	24/60		16/40		100

Course Outcome:

- After learning the course the students should be able to:
- Analyze reactive power requirement and management.
- Assess and evaluate various compensators.
- Simulate and design compensators.
- Analyze various control schemes in HVDC system

SYLLABUS

UNIT-I **[09]**

REACTIVE POWER CONTROL IN TRANSMISSION SYSTEMS

Reactive power, Uncompensated transmission line: load compensation, system compensation, Lossless distributed parameter line: symmetrical lines, mid point conditions of a symmetrical line, Passive compensation: shunt compensation, series compensation, effect on power transfer capacity.

UNIT-II **[10]**

STATIC VAR SYSTEMS

Types, characteristics, compensative SVS-power system characteristics, thyristor controlled reactor (TCR), principle of operation, characteristics, and harmonics, control strategies, thyristor switched capacitors (TSC), principle of operation, characteristics, and dynamic response, series capacitors, reinsertion schemes, protective gear, modeling of static VAR systems, FC-TCR type, representation in power flow, dynamic and transient stability studies, FC-TCR steady state characteristics, modeling of controller dynamics, protection of SVS-brief outline of schemes.

UNIT-III **[14]**

THYRISTOR CONTROLLED SERIES CAPACITOR (TCSC)

Basic scheme, principle and application, thyristor controlled phase angle regulator, basic scheme, principle and application, reactive power generation/absorption using solid-state devices, VSI configuration & principle of operation.

STATIC COMPENSATOR (STATCOM)

Principle of operation, 6 pulse & multiple configurations, steady state characteristics, control strategy, comparison with FC-TCR SVC.

UNIT-III **[12]**

STATIC SYNCHRONOUS SERIES COMPENSATOR (SSSC)

Introduction, Operation of SSSC and control of power flow, Modeling and control of SSSC, SSSC with an energy source, Application of SSSC.

UNIFIED POWER FLOW CONTROLLER (UPFC)

General configuration combined voltage control, series compensation and phase angle regulation, practical implementation schemes, comparison of UPFC with conventional controllers.

Text Book

(1) Padiya K. R, "FACTS Controllers in power transmission and distribution", New Age Pub, 1st. Edtion,2007.

Reference Book

(2) Hingorani N. G, L Gyugyi, "Understanding FACTS", IEEE Press, 2000.

(3) Mathur R. N., Verma R.K., "Thyristor based FACTS Controllers for Electrical Transmission Systems", John willey,2002.

(4) E Acha, V G Agelidis, O Anaya-Lara, T J E Miller, "Power Electronic Control in Electrical Systems", NewnessPower Engineering Series, 2006.

(5)T J E Miller, "Reactive Power Control in Electrical Systems", John willey, 1982.

Subject: **Advanced Power Electronics & Applications**								
Program: **B.Tech. Electrical Engineering**				Subject Code: EL0707			Semester: **VII**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	2	0	4	24/60		16/40		100

Course Outcome:

After learning the course the students should be able to:

- Evaluate different dc-dc voltage regulators
- Simulate and analyze resonant converters
- Select appropriate phase shifting converter for a multi-pulse converter
- Evaluate various multi-level inverter configurations
- Compare various FACTS devices for VAR compensation

SYLLABUS

UNIT-I **[10]**

MODERN SEMICONDUCTOR DEVICES

Power Diodes, Power BJT, Power MOSFETs, Thyristor, GTOs, IGBT, MCT – Basic characteristics and controlling, Emerging devices and circuits, Power Integrated Circuits

PRACTICAL DESIGN CONSIDERATION

Gate and Base drive circuits – Design Consideration for different Devices, DC-Coupled Circuits, Isolated Drive Circuits, and Protection in Drive Circuits. Snubber circuits Designing, Temperature control and Heat sink design consideration, Design of Magnetic Components.

UNIT-II **[16]**

DC-DC SWITCHED MODE CONVERTERS

Introduction, Step-Down (Buck) Converter, Step-Up (Boost) Converter, Buck-Boost Converter, Cuk Converter, Control Principles, Applications of DC-DC Converters.

SWITCHING DC POWER SUPPLIES

Introduction, Linear Power Supplies, Switching Power Supplies, DC-DC Converter with isolation

- Flyback converters, Half Bridge Converters, Full Bridge converters, Forward Converter, Push-pull converter, Protection, Isolation and Design criteria for SMPS.

UNIT-III **[11]**

STATIC POWER ELECTRONICS APPLICATIONS

Electronic Ballasts, UPSs, Power Electronics in Capacitor Charging Applications, Power Electronics for Renewable Energy Sources HVDC Transmission, Automotive Applications of Power Electronics.

POWER ELECTRONICS IN POWER QUALITY

Power Quality, Reactive Power and Harmonic Compensation, IEEE Standards, Static VAR Compensator, Thyristor Controlled Reactor (TCR), Thyristor Switched Capacitors (TSC), Principal of Active Filters, Types of Active Power Filters, Shunt Active Power Filters, Series Active Power Filters.

UNIT-IV **[08]**

PWM TECHNIQUES AND PWM INVERTERS

Single pulse modulation, Multi-pulse modulation, Selective harmonic elimination, Sine-triangle PWM- Unipolar & Bipolar, SVPWM, Phase shifted and Level shifted PWM, Single Phase and Three phase PWM Inverter.

Text Book

1. Rashid, M. H., "Power Electronics Handbook", Elsevier Academic Press, 2001
2. Ned Mohan, Tore M. Undeland and William P. Robbins, "Power Electronics Converters, Applications, and Design",

Reference Book

1. John Willey & Sons, Inc., 2nd Edition, 1995.
2. Agrawal, J. P., "Power electronic systems: Theory and design" , Addison Wesley Longman (Singapore) Pte. Ltd. New Delhi, 2001.
3. Rashid, M. H., " Introduction to PSpice Using OrCAD for Circuits and Electronics " , Prentice-Hall of India Pvt. Ltd., New Delhi, Eastern Economy Edition, Third Edition 2006.
4. Singh, M. D., Khanchandani, K. B., "Power electronics", Tata McGraw-Hill Publishing Co. Ltd., New Delhi, 2001

Subject: **Power System Planning**								
Program: **B.Tech. Electrical Engineering**				Subject Code: EL0708			Semester: **VII**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	2	0	4	24/60		16/40		100

Course Outcome:

After learning the course the students should be able to:

1.Design transmission line (electrical and mechanical aspects)

2.Design primary and secondary distribution.

3. Selection of sizes and location of generating stations, substations.

4. Explain the basic concepts of power system earthing and measurement of earthing resistance.

5. Explain the basic concepts of insulation co-ordination.

6. Explain the basic concepts of generation planning, transmission planning and distribution planning.

SYLLABUS

UNIT-I **[11]**

FORECASTING-NEEDS & USES

Current Status Of Forecasting, Fundamentals Of Quantitative Forecasting, Explanatory And Time Serious Forecasting, Least Square Estimates, Peak Load Forecasting, Accuracy of Forecasting Methods, Regression Methods, Box Jenkins Time Serious Methods.

UNIT-II **[12]**

SHORT AND LONG TERM FORECASTING TECHNIQUES

Problems facing electricity industry, Long term forecasting techniques, Methods of long term forecasting, Spatial load forecasting, Multivariate procedures, Short term forecasting techniques.

UNIT-III **[11]**

FORECASTING AND PLANNING

The role of forecasting in planning, Comparison and selection of forecasting methods, The accuracy of forecasting methods, Pattern of the Data and its effects on individual forecasting methods, Time horizon effects on forecasting methods.

UNIT-IV **[11]**

GENERATION PLANNING

Fundamental economic analysis, Generation planning optimized according to enerating unit categories, distribution & Transmission system planning.

Text Book

1. Makridakis, Spyros, "Forecasting methods and application", John Wiley, 1993.
2. X.Wang & J.R. Mc Donald , "Modern Power system planning", McGraw. Hill, 1993
3. A.S Pabla , "Electrical Power system planning", Mac Millan,Delhi,1998

Reference Book

4. Sullivan, "Power system planning", McGraw. Hill ,1977

Lakervi E, E J Holmes, "Electricity distribution network design", IEE, 2nd edition, 2003

Subject: **Disaster Management**								
Program: **B.Tech. Electrical Engineering**				Subject Code: CV0712			Semester: **VII**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
1	0	0	0	24/60	0	16/40	0	100

Course Objectives:

1. To explain students the conceptual applications and principles of management to mitigate various disasters.

Course Outcome:

1. Understand disasters, disaster preparedness and mitigation measures.
2. Understand role of IT, remote sensing, GIS in risk reduction.
3. Understand disaster management acts and guidelines along with the role of various stack-holders during disasters.

COURSE CONTENTS:

UNIT-I **[03]**

Introduction

Concepts and definitions: disaster, hazard, vulnerability, risk, capacity, impact, prevention, mitigation)

UNIT-II **[04]**

Disasters classification

Natural disasters (floods, drought, cyclones, volcanoes, earthquakes, tsunami, landslides, coastal erosion, soil erosion, forest fires etc.); manmade disasters (industrial pollution, artificial flooding in urban areas, nuclear radiation, chemical spills etc); hazard and vulnerability profile of India, mountain and coastal areas, ecological fragility

UNIT-III **[06]**

Disaster Impacts

Disaster Impacts (environmental, physical, social, ecological, economic, political, etc.); health, psycho-social issues; demographic aspects (gender, age, special needs); hazard locations; global and national disaster trends; climate-change and urban disasters. Disaster Risk Reduction **Disaster management cycle**

Phases; prevention, mitigation, preparedness, relief and recovery; structural and non-structural measures; risk analysis, vulnerability and capacity assessment; early warning systems, Post-disaster environmental response (water, sanitation, food safety, waste management, disease control); Roles and responsibilities of government, community, local institutions, NGOs and other stakeholders; Policies and legislation for disaster risk reduction, DRR programmes in India and the activities of National Disaster Management Authority.

UNIT-IV **[02]**

Applications of Science and Technology for Disaster Management and Mitigation

Geo-informatics in Disaster Management (RS, GIS and GPS), Disaster Communication System (Early Warning and Its Dissemination), Land use planning and development regulations, Disaster safe designs and Development Regulations, Disaster safe designs and Construction structural and Non structural Mitigation of Disasters. Science and Technology Institutions for Disaster Management in India.

Text Books:

1. Ghosh G.K., 2006, Disaster management, APH Publishing Corporation.

Reference Books:

2. Pradeep Sahni, 2004, Disaster Risk Reduction in South Asia, Prentice Hall.
3. Singh B. K., 2008, Handbook of Disaster Management: techniques and guidelines, Rajat Publications

Web resources:

1. http://nidm.gov.in/PDF/Disaster_about.pdf
2. https://www.slideshare.net/Jyothi19587/disaster-ppt
3. https://www.slideshare.net/SayefAmin1/natural-disaster-its-causes-effects
4. https://www.slideshare.net/rahulp4/man-made-disasters-23947076
5. https://www.slideshare.net/urveshprajapati3990/disaster-management-in-india-56546805
6. www.ndmindia.nic.in/presentation/Presentation%20by%20JS%20(DM)%20(1).ppt
7. https://www.geospatialworld.net/article/information-technology-and-natural-disaster-management-in-india/
8. http://www.bvicam.ac.in/news/NRSC%202007/pdfs/papers/st_230_03_02_07.pdf
9. http://eagri.tnau.ac.in/eagri50/ENVS302/pdf/lec13.pdf
10. http://nptel.ac.in/courses/105105104/pdf/m16l39.pdf
11. https://www.unisdr.org/we/inform/events/50220

MOOCs:

1. https://www.mooc-list.com/tags/disaster-management

8TH SEMESTER

Approved Vide Agenda Item No. 03 of Minutes of Meeting of Academic Council held on 11 July 17

B-TECH ELECTRICAL ENGINEERING, SEMESTER –VIII TEACHING & EXAMINATION SCHEME WITH EFFECT FROM JULY 2017														
SR NO	CODE	SUBJECTS	TEACHING SCHEME			CREDITS	HOURS	EXAMINATION SCHEME						
								THEORY			PRACT		TOTAL
								CIE					
			L	T	P			MID	IE	ESE	CIE	ESE	
1	EL0801	Project	00	00	40	20	40	00	00	00	40	60	100
TOTAL			**00**	**00**	**40**	**20**	**40**	00	00	00	40	60	100

Approved Vide Agenda Item No. 03 of Minutes of Meeting of Academic Council held on 11 July 17

Subject**: Project**								
Program: **B. Tech Electrical Engineering**				Subject Code: EL0801			Semester**: VIII**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
0	0	40	20	00	60	00	40	100