Chhattisgarh Swami Vivekanand Technical University, Bhilai

SCHEME OF TEACHING AND EXAMINATION

B.E. VIIIth SEMESTER ELECTRICAL AND ELECTRONICS ENGINEERING

Sr. No.	Board of Study	Subject Code	Subject	Periods per week			Scheme of Exam			Total Marks	Credit L+ (T+P) / 2
				L	T	P	Theory / Practical				
							ESE	CT	TA		
1	Electrical & Electronics Engg.	325831(25)	High Voltage Engg.	4	0	-	80	20	20	120	4
2	Electrical & Electronics Engg.	325832(25)	Management Concepts & Techniques	4	0	-	80	20	20	120	4
3	Electrical Engg.	325833(25)	Computer Aided Power System	4	0	-	80	20	20	120	4
4	**Refer Table -3**		**Professional Elective -III**	3	1	-	80	20	20	120	4
5	**Refer Table –4**		**Open Elective - IV**	3	1	-	80	20	20	120	4
6	Electrical & Electronics Engg.	325861(25)	Computer Simulation Lab	-	-	3	40	-	20	60	2
7	Electrical & Electronics Engg.	325862(25)	Installation Maintenance & Testing of Electrical Equipments., Lab	-	-	3	40	-	20	60	2
8	Electrical & Electronics Engg.	325863(25)	High Voltage Engg. Lab	-	-	3	40	-	20	60	2
9	**Electrical & Electronics Engg.**	325864(25)	**Major Project**	-	-	6	100	-	80	180	3
10	**Electrical & Electronics Engg.**	325865(25)	**Report Writing & Seminar**	-	-	1	-	-	40	40	1
11	Library			-	-	1	-	-	-	--	-
	Total			**18**	**2**	**17**	**620**	**100**	**280**	**1000**	**30**

L- Lecture T- Tutorial P- Practical , ESE- End Semester Exam CT- Class Test TA- Teacher's Assessment
** To be completed after VI Sem. and before the commencement of VII Sem .

Table -3
Professional Elective –III

S.No.	Board of Study	Subject Code	Subject
1	Electrical Engg.	325841(25)	EHV AC & DC Transmission
2	Electrical Engg.	324842(24)	Flexible AC Transmission System
3	Electrical Engg.	324848(24)	Satellite Communication
4	Electrical & Electronics Engg.	325843(25)	Power Quality
5	Electrical & Electronics Engg.	325844(25)	Smart Grid Systems
6	Electrical Engg.	324844(24)	VLSI Design

Table - 4

Open Elective –IV

S.No.	Board of Studies	Code	Name of Subject
	Management	300851(76)	Enterprise Resource Planning
	Information Technology	300852(33)	E-Commerce & strategic IT
	Management	300853(76)	Technology Management
	Information Technology	300854(33)	Decision Support & Executive Information system
	Computer Science & Engg.	300855(22)	Software Technology
	Management	300856(76)	Knowledge Entrepreneurship
	Management	300857(76)	Finance Management
	Management	300858(76)	Project Planning, Management & Evaluation
	Mechanical Engg.	300859(37)	Safety Engineering
)	Computer Science & Engg.	300801(22)	Bio Informatics
	Mechanical Engg.	300802(37)	Energy Conservation & Management
2	Nanotechnology	300803(47)	Nanotechnology
3	Management	300804(76)	Intellectual Property Rights
4	Mechanical Engg.	300805(37)	Value Engineering
5	Civil Engg.	300806(20)	Disaster Management
6	Civil Engg.	300807(20)	Construction Management
7	Civil Engg.	300808(20)	Ecology and Sustainable Development
8	Chem. Engg.	300809(19)	Non Conventional Energy Sources
)	Electrical Engg.	300810(24)	Energy Auditing and Management
)	Mechanical Engg.	300811(37)	Managing Innovation & Entrepreneurship
	Information Technology	300812(33)	Biometrics
2	Information Technolgy	300813(33)	Information Theory & Control
3	Computer Science & Engg.	300814(22)	Supply Chain Management
4	Computer Science & Engg.	300815(22)	Internet & Web Technology
5	Electrical Engg.	300816(24)	Electrical Estimation and Costing
6	Electrical& Electronics Engg.	300817(25)	Non Conventional Energy Sources

ote (1)-1/4th of total strength of students subject to minimum

Note -1/4th of total strength of students is required to offer an elective in thecollege in a particular academic session.

CHHATISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY,BHILAI (C.G.)

Semester: VIIIth **Branch: EEE/EE**

Subject: High Voltage Engineering **Code: 325831(25)**

Total Theory Periods: 40 **Total Tutorial Periods:-**

Total Marks in End Semester Exam: 80

Course Objectives:

The course is an advanced course in high voltage technology and electrical insulating materials. It deals with basic gaseous, liquid and solid dielectric breakdown theories. It also contains important experimental methods of high voltage generation and measurement. The course makes the students familiar with various applications where high voltage field is used.

Course Outcomes: Students should be able to:

1. Describe the various breakdown theories for gaseous, liquid and solid dielectric.
2. Describe the generating methods for high DC, AC, and impulse.
3. Describe the measuring methods for high DC, AC and impulse.
4. Compute the breakdown strength of gas filled insulation systems with sphere gap**.**

UNIT – I:

Levels of high voltages, necessity of EHV and its limitations, Electrical insulation and dielectrics, Electrical fields - Uniform and non-uniform fields (weekly and extremely), Electric field, intensity/stress, degree of non-uniformity, Types of insulation - gas, liquid, and solids, Types of ionizations - impact, thermal and photo-ionization, Electron avalanche in uniform field, Townsend's first and second Criterion for breakdown, Streamer theory of breakdown, Paschen's law, Discharge in Weakly non-uniform field, Law of similarity of discharge, Discharge in extremely nonuniform field, Partial breakdown corona, Star, streamer and leader types, Corona loss in transmission lines, Methods of reducing corona loss.

UNIT – II: Breakdown in Liquid Dielectrics:

Types of liquid dielectrics, pure and commercial liquids, Conduction & breakdown in commercial liquids-suspended particle theory, Cavitation and the bubble theory, determination of breakdown strength of transformer oil, Factors affecting dielectric strength of liquids.

Breakdown in Solid Dielectrics: Breakdown mechanism, Intrinsic breakdown, Electromechanical breakdown, thermal breakdown, breakdown of solid dielectric in practice, Breakdown due to treeing & tracking, breakdown due to the internal discharges.

UNIT III: Generation of high voltages

Generation of high D.C. voltages, half wave & full wave rectifier circuits, Van De Graff generators, Electro static Generators, Generation of high alternating voltages, cascade transformers, Generation of impulse voltages, Multistage Impulse generator, Marx circuit, Tripping & control of Impulse generators

UNIT IV: Measurement of high Voltages

Measurement of high D.C.voltage, Measurement of high A.C.& impulse voltages, series Impedance voltmeter, series capacitance voltmeter capacitance potential dividers & capacitance voltage transformers, Resistance potential dividers, Electrostatic voltmeter, Spark gap for measurement of high D.C., A.C. & impulse voltages, Potential divider for impulse voltage measurements, CRO for impulse voltage measurements.

UNIT V: Over Voltage phenomena and Insulation coordination

Lightning phenomena as natural cause for overvoltage, Overvoltage due to switching surges and abnormal conditions, principles of insulation coordination. Protection of equipment from lightning stroke, protection of rotating machines and substations from lightning stroke.

High Voltage Testing of Electrical Apparatus: Test on insulators, Dry & wet flash Over tests & withstand tests, Impulse flash over & withstand voltage test, High voltage tests on cables Impulse testing of transformers.

Non-Destructive Testing: Measurement of dielectric constant & loss factor, High voltage Schering Bridge, Partial Discharge Measurements.

Text Books:

1. C.L. Wadhwa - High Voltage Engg.(2nd Ed New Age International Ltd.)
2. M.S. Naidu & V. Kamraju - High Voltage Engg.(3rd EdTata McGraw Hill)
3. An Introduction to High Voltage Engineering, Subir Ray, PHI.

Reference Books:

1. High voltage Insulation Engineering by Ravindra Arora, New Age International.
2. High voltage Engineering by D. V. Razevig and Chaurasia, khanna pbs.

CHHATISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY,BHILAI (C.G.)

Semester: VIIIth **Branch: EEE/EE**

Subject: Management Concepts & Technique **Code: 325832(25)**

Total Theory Periods: 40 **Total Tutorial Periods:-**

Total Marks in End Semester Exam: 80

Course Objectives:

1. To develop skill of project planning and management amongst student.
2. To understand the significance of human recourse and its proper utilization for the growth of organization .
3. Students will learn to minimize the project cost by using effective management technique.

Course Outcomes:

1. Students can successfully design and execute project.
2. Students will be capable of understanding the correlation between physical ,market and human resources

UNIT I: Basic management and techniques

Planning, nature purpose and objectives of planning, organizing, nature and purpose of organizing, authority and responsibility, staffing, supply of human resources, performance appraisal, controlling, system and process of controlling, control techniques.

Human resource management: nature and scope of human resource planning, training and development, recruitment and selection, career growth, absenteeism, grievances, motivation and its types, need of motivation, reward and punishment, models of motivation, leaders, types of leaders, leadership styles, roles and functions of leaders, conflict management, types and causes of conflict, group and team working, organizational design and development.

UNIT II: Marketing management

Marketing environment, customer markets and buyer behavior, marketing mix, advertising and sales promotion, channels of distribution. Financial management and accounting concepts: book keeping, financial statements analysis, financial ratios, capital budgeting, and breakeven analysis.

UNIT III: Production/operations management

planning and design of production and operations systems, facilities planning, location, layout and movement of materials, materials management and inventory control, maintenance management, PERT and CPM.

UNIT IV: Management information systems

Role of information in decision making, information system planning, design and implementation, evaluation and effectiveness of the information system, statistical quality control, total quality management and ISO certificate.

UNIT V: Social and ethical issues in management: ethics in management, social factors, unfair and restrictive trade practices. Strategic and technology management: need, nature, scope and strategy SWOT analysis, value chain concept.

Text Books:

1. Industrial management and engineering economics, K. C. Arora, Khanna Pbs.
2. Industrial engineering and production management, Martand Telsang, S. Chand
3. Industrial management and organization, Ahuja, Khanna Pbs.
4. Industrial engineering and management, O. P. Khanna, DRD

Reference Books:

1. Industrial organization and management, Ramchandran, Ramana Mutrhy, TMH.
2. Management science, Ramchandra, TMH.
3. Industrial engineering and production management, Mahajan, DRP.
4. Management theory and practice, Chandan, Vikas Pbs

CHHATISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY,
BHILAI (C.G.)

Semester: VIIIth **Branch: EEE**
Subject: Computer Aided Power System **Code: 325833(25)**
Total Theory Periods: 40 **Total Tutorial Periods: -**
Total Marks in End Semester Exam: 80

Course Objectives:

1. This course will cover the modeling issues and analysis methods for the power flow, short circuit, contingency and stability analyses, required to be carried out for the power systems.

2. Necessary details of numerical techniques to solve nonlinear algebraic as well as differential equations will also be included.

3. Different types of stability phenomena have been observed in the power systems, which need to be critically analyzed, utilizing appropriate dynamic model of the system.

Course Outcomes: On completion of this course, students should be able to:

1. Use software packages for design and analysis of electrical power networks and investigate typical case study problems.
2. Develop computer based tools for specific applications in power system analysis, design and operation.

Unit-1 Power system Network equations
Network equations, graph theory, Bus admittance matrix by step by step method, primitive network, bus incidence matrix, formation of Y_{bus} by singular transformation, bus impedance matrix by inversion of Y_{bus}, algorithm for bus impedance matrix, addition of a branch, addition of link, modification of Z_{bus} by changes in primitive network.Concept of using these matrices for load flow study and fault study.

Unit-2 Fault Analysis in Power System
Fault Analysis, [Z_{bus}] Building algorithm,sequence matrices, Symmetrical and Unsymmetrical Short-Circuit Analysis of Large Power Systems, Phase Shift in sequence quantities due to transformers.

Unit-3 AC Power Flow Analysis
Introduction, Modeling of Power System Components, Power Flow Equations, Formation of Y_{bus} Matrix, Power Flow Solution Algorithms, Newton Raphson Load Flow Method, Fast Decoupled Load Flow Method And DC Load Flow Method, AC-DC System Power Flow Analysis-Sequential and Simultaneous Solution Algorithms, Introduction to optimal load flow technique

Unit-4 Stability Analysis
Transient stability studies, introduction, swing equation, machine equations, power system equations, solution techniques, example of transient stability calculations, exciter and governor control system, description of transient stability program.

Unit-5 Security Analysis
Basic Concepts, Power System Security, Factors affecting Security Static Security Analysis at Control Centers, Contingency Analysis, Contingency Selection, Contingency Analysis Using Network Sensitivity Method and AC Power Flow Method

Text Books:-

1. H. Sadat, .Power System Analysis., McGraw Hill Co. Ltd., India, 2000.
2. G. W. Stagg and A. H. El- Abiad, Computer methods in Power System Analysis, Mc -Graw Hill Kogakusha Ltd 1968.

References Books:-

1. A.K. Mahaianabis, D.P. Kothari, S.I. Ahson, .Computer Aided Power System Analysis & Control. Tata McGraw Hill, New Delhi, 1988.
2. O.I. Elgard, .Electric Energy System Theory: An Introduction., 2 nd Edition, McGraw Hill, New York, 1982.
3. I.J.Nagarath, D.P. Kothari, .Modern Power System Analysis., Tata McGraw Hill Publishing Co. Ltd., New Delhi, 1994.
4. J. Arrilaga, C.P. Arnold, B.J. Harker, .Computer Modelling of Electric Power Systems.

CHHATISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY,BHILAI (C.G.)

Semester: VIIIth **Branch: EEE**
Subject: Computer Simulation Lab **Code: 325861(25)**
Total Practical Periods: 36
Total Marks in End Semester Exam: 40

List of Experiments :(minimum 10 experiments to be performed)

1. Simulation of different types of controllers (PID, PI, PLL).

2. Simulation for the addition of poles and zeros in a given transfer function.

3. Simulation of different types of filters.

4. Simulation of the performance of a full wave bridge rectifier for RL and RLC load.

5. Simulation of step up and step down choppers.

6. Simulation of chopper controlled DC motor.

7. Simulation and modeling of synchronous machine (X_d,X_d')

8. Write a program for computation of real, reactive power and line loss.

9 Write a program to plot V and inverted V curve.

10. Write a program for transformer parameter calculation.

11 Write a program for transmission line parameter calculation (Z, Y, A, B, C, D).

12 Write a program for load flow solution by Gauss Seidal Method.

13 Write a program for load flow solution by Newton Raphson Method.

14 Write a program for economic load dispatch calculation.

15 To Determine fault location in a cable.

Requirements for the Simulation Lab:

PSCAD, MiPower, MATLAB/Simulink

REFERENCE BOOKS:

1. Power System Analysis, Hadi Saddat
2. Intoduction To Matlab, Palm

CHHATISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY,BHILAI (C.G.)

Semester: VIIIth **Branch: EEE**
Subject: Installation Maintenance & Testing of Electrical Equipments. Lab **Code: 325862(25)**
Total Theory Periods: 36
Total Marks in End Semester Exam: 40

List of Experiments: (To be performed minimum 10 experiments)

1. Calibration of Ammeter and voltmeter
2. To study and prepare the standard operating procedure required while taking electrical shutdown.
3. Calibration of Wattmeter
4. Calibration of Energy meter.
5. Testing of wiring installation using megger.
6. Testing of Cable using Spark Tester
7. Current Transformer Testing.
8. Potential Transformer Testing
9. To study the Installation of Plate and Pipe earthing
10. Measurement of Earth Resistance using Earth Tester.
11. To study the installation and routine test required for commissioning of 3phase Induction motor
12. Study of Installation of Pole Mount Substation and preparation of it's estimate.
13. Installation, Maintenance and Testing of HPMV/ Sodium Vapour/ Metal Halide Lamp
14. Live Demonstration of Fire Fighting to extinguish Electrical Fire using Dry Powder type Fire extinguisher. (Mock Demo to entire group/class at a time; No batch size limitation)
15. Live Demonstration of Artificial Respiration Techniques, Preferably by a Doctor with the help of Dummy Model. (Mock Demo to entire group/class at a time; No batch size limitation)

Apparatus Required:

1. CT, PT
2. Energy meters
3. Ammeter, Voltmeter
4. Induction motor
5. Megger
6. Cable Tester
7. Fire extinguisher

Reference Books:

1. Testing, commissioning, operation and maintenance of Electrical equipments - S. Rao, 6th Edn. Khanna Publishers.
2. A course in electrical and electronic measurement and instrumentation, Sawhney.

CHHATISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY,BHILAI (C.G.)

Semester: VIIIth **Branch: EEE**

Subject: High Voltage Engg. Lab **Code: 325863(25)**

Total Theory Periods: 36

Total Marks in End Semester Exam: 40

List of Experiments: (Minimum 10 experiments to be performed)

1. High voltage DC Testing of cables.
2. Measurement of peak value of voltage by Ryall Crest Voltmeter.
3. Comparison of dielectric strength of air and insulating oil (X-mer oil).
4. Determine the break down voltage of x'mer oil for airgap with different electrodes.
5. Study of 100 kv power frequency, high field voltage X'mer & it's accessories.
6. To determine the break down voltage for two parallel conductors for various spacing
7. Determination of string efficiency of insulator string with guard ring.
8. Determination of string efficiency of insulator string with out guard rings
9. To determine dry and wet flash over voltage of string efficiency.
10. To determine flash pt of an oil using pensky marten's apparatus also determine the fire pt.
11. To determine flashover voltage of string insulator.
12. Measurement of high voltage using Schering Bridge.
13. Measurement of Relative permittivity of the given material
14. Determination of breakdown voltage Vs distance curve for sphere gap.
15. Measurement of rms voltage by X-mer ratio test.

Apparatus Required:

1. HV testing Transformer
2. Voltmeter
3. Power frequency high voltage transformer
4. Sphere arrangement
5. Schering bridge kit
6. Auto transformer
7. Transformer insulating string
8. Oil testing kit

Reference Books;

1. HV Engg.: Naidu & kamaraju.
2. Electrical instrument & Measurement A.K.Sawhney

CHHATISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY,BHILAI (C.G.)

Semester: VIIIth **Branch: EEE/EE**
Subject: EHV AC/ DC Transmission **Code: 325841(25)**
Total Theory Periods: 36 **Total Tutorial Periods: 12**
Total Marks in End Semester Exam: 40

Course Objectives:

1. This course presents EHV ac-dc transmission system components.
2. Also the course deals with fundamentals of ac-dc links,converters operation and their dynamic characteristics.

Course Outcomes: On completion of the course :

1. Students could grasp the key technology and system composition in modern HVAC & HVDC design.
2. Students could get familiar with the process of scientific research and report writing.
3. Students could develop the abilities to put forward, analyze and solve problems.
4. Students could intensify capacity in scientific research and innovation.

UNIT-1: AC Power Transmission Technology
Sequential impedances of AC systems EHVAC transmission over voltages, insulation design of lightning and switching over voltages, High voltage testing of AC equipments, Reactive Power compensation of EHV AC lines.

UNIT-2: DC Power Transmission Technology
Application of DC Transmission, Description of DC Transmission System, Planning for HVDC Transmission, Modern Trends in DC Transmission, Multi-terminal HVDC system (MTDC),Thyristor Device, Thyristor Valve, Valve Tests, Recent Trends in valves. Comparison of EHV AC & DC transmission.

UNIT-3: HVDC Converters & System Control
Pulse Number, Choice of Converter Configuration, Simplified Analysis of Graetz Circuit, Converter Bridge Characteristics. Characteristics of a Twelve Pulse Converter, Detailed Analysis of Converters Principal of DC Link Control, Converter Control Characteristics, Firing Angle Control, Current and Extinction Angle Control, Starting and Stopping of DC Link,.

UNIT-4: Controlling Features
Control of EHV d.c. system desired features of control, control characteristics, Constant current control, Constant extinction angle control. Ignition Angle control. Parallel operation of HVAC & DC system. Problems & advantages.

UNIT-5 : Smoothing Reactor and DC Line
Smoothing Reactors, DC Line, Transient Over Voltages in DC Line, Protection of DC Line, DC Breakers, Monopolar Operation, Effects of Proximity of AC and DC Transmission Lines

Harmonics and Filters: Generation of Harmonics, Design of AC Filters, DC Filters, Carrier Frequency and RI Noise.

Textbooks:

1. Rakesh Das Begmudre, Extra High Voltage AC Transmission Engineering, Wiley Estern Limited.
2. K.R. Padiyar, HVDC Power Transmission System , Wiley Estern Limited.
3. E.W. Kimbark. EHV-AC and HVDC Transmission Engineering & Practice, Khanna Publishers.

Reference Books:

1. S.Rao, EHV AC & DC Transmission.
2. Arrillaga, “HVDC Transmission” 2nd Edition, IEEE London Publication
3. S. Rao, “EHV AC and DC Transmission” Khanna Publication

CHHATISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY,BHILAI (C.G.)

Semester: VIIIth **Branch: EEE/EE**

Subject: Flexible AC Transmission System **Code: 324842(24)**

Total Theory Periods: 36 **Total Tutorial Periods: 12**

Total Marks in End Semester Exam: 40

Course Objective:

1. To understand the concept of flexible AC transmission and the associated problems.
2. To review the static devices for series and shunt control.
3. To study the operation of controllers for enhancing the transmission capability.

Course Outcome:-

1. Engineering Students from Transmission Utilities involved in the design, Interconnected EHV/HV Systems.
2. Students will also gain the knowledge of Advanced Power Electronics devices.

UNIT I : Introduction:-

Flow of power in AC system, loading capability, controllable parameters, basic types of FACTS controllers, introduction of SCR's, MOSFET's, IGBT's with working principles and its applications.

UNIT II: Voltage Source Converters (VSC)

Basic concepts of VSC, single-phase full wave bridge converter operation, single phase-leg operation, three-phase full wave bridge converter and its operation, transformer connections for 12-pulseUNIT III: **UNIT III: Current source converters (CSCs)**

Basic concepts, three-phase CSCs, three-phase full wave rectifier, comparison of VSC and CSC. Static shunt compensators: basic concepts, method of controllable VAR generation, variable impedance type static var generators – TCR and TSR, TSC, FC-TCR, TSC-TCR. Introduction to Static VAR compensator (SVC), application of SVC in power systems

UNIT IV: Emerging Facts Controller

Introduction, mathematical model, working of STATCOM, V-I and V-Q characteristics, transient stability enhancement and exchange of real power using STATCOM, comparison of SVC and STATCOM, Merits of hybrid compensators.

UNIT V: Static Series Compensators

Objectives of series compensation, variable impedance type series compensation: GTO thyristor controlled series capacitors (GCSC), thyristor controlled series capacitor (TCSC), basic concepts of GCSC and TCSC. Introduction to Unified Power Flow Controller (UPFC)

Text Books:

1. Understanding FACTS by Hingorani.

2. Mohan Mathur, R., Rajiv. K. Varma, "Thyristor – Based Facts Controllers for Electrical Transmission Systems", IEEE press and John Wiley & Sons, Inc

Reference Books:

1. A.T.John, "Flexible AC Transmission System", Institution of Electrical and Electronic Engineers (IEEE), 1999.

2. Narain G.Hingorani, Laszio. Gyugyl, "Understanding FACTS Concepts and Technology of Flexible AC Transmission System", Standard Publishers, Delhi 2001.

CHHATISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY,
BHILAI (C.G.)

Semester : VIIIth **Branch: EEE/EE**

Subject: Satellite Communication **Code:324848(24)**

Total Theory Periods: 36 **Total Tutorial Periods: 12**

Total Marks in End Semester Examination: 80

Course Objective:

1. To know basic concept of satellite communication
2. To understand various factor which affects satellite communication
3. To know about various applications of satellite communication in modern age.

Course outcome:

1. Students will be able to understand how does satellite works for communication
2. Student will be able to understand various applications of satellite communication
3. student will be able to understand various types of techniques used in satellite communication

UNIT-I Introduction of satellite communication

Synchronous satellite; Synchronous orbit; Orbital parameters; Satellite location with respect to earth; Look angles; Earth coverage and slant range; Eclipse effect; Satellite frequency allocation and band spectrum; General and technical characteristics of satellite communication system; Advantages of the satellite communication; Active and Passive satellite systems; Current trends in satellite communication.

UNIT-IICommunication Satellite Link Design

Link design equation; System noise temperature; C/N, G/T ratio; Atmosphere and ionosphere effects on link design; Uplink deign; Complete link design; Interference effects on complete link design; Earth station parameters. SATELLITE COMMUNICATION LINKS: Analog baseband signal; FDM techniques: SNR and CNR in FM in satellite link; SNR in FM with multiplexed telephone signals: Analog FM/FDM TV satellite link.

UNIT-IIIMultiple Access Techniques

TDMA-Frame and burst structure; Frame Efficiency; Superframe: TDMA frame acquisition and synchronization: FDMA compared to TDMA; TDMA burst TME plan; multiple beam TDMA satellite system; Beam hopping TDMA; CDMA and hybrid access techniques.

UNIT-IVCommunication Satellite Subsystem

Power supply; Attitude and orbit control; Propulsion subsystem; Repeaters; Antenna subsystem; TTC subsystem; Thermal subsystem; Structure subsystem; Reliability of satellite subsystem.

UNIT-V Satellite Earth Stations

Earth station design requirements; Earth station subsystem; Monitoring and control; Frequency coordination; Small earth station VSAT; Mobile and transport earth station; TVRO system

Text Books:

1. Satellite Communications, Dr. D.C. Agarwal, Khanna Publishers
2. Fundamentals of Satellite Communication, Raja Rao, Pearson Education.

Reference Books:

1. Satellite Communication, Mitra, PHI
2. Satellite Communication System Engineering, Pritchard, Pearson Education
3. Satellite Communication, Timothy Pratt, John Wiley & sons
4. Satellite Communication, Robert M. Gagliardi, CBS Publishers & Distributors

CHHATISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY,BHILAI (C.G.)

Semester : VIIIth **Branch: EEE**

Subject: Power Quality **Code:325843(25)**

Total Theory Periods: 36 **Total Tutorial Periods: 12**

Total Marks in End Semester Examination: 80

Course Objective :

This course is designed to teach students the fundamentals of power quality. The primary objective of this course is to introduce students to basic concept harmonics and other power quality problem and its compensation technique and also neutral grounding problem and its solution.

Course Outcome: A student who successfully completes this course should be able to:

1. Understand the power quality , its classification measure and standard.
2. Understand the different types of harmonics and harmonics introducing devices.
3. Understand the power quality problem, problems generated by drives and other devices and its effect on power system.
4. Understand the different compensation technique of power quality and improvement of power factor.
5. Understand the different neutral grounding technique, different grounding and wiring problem and its solution.

UNIT IIntroduction - power quality:

power quality, voltage quality, overview of power quality phenomena, classification of power quality issues, power quality measures and standards, THD -TIF-DINC message weights-flicker factor-transient phenomena, occurrence of power quality problems, power acceptability curves,

UNIT IIHarmonic introducing devices,

Harmonics, individual and total harmonic distortion, RMS value of a harmonic waveform, triplex harmonics, important harmonic introducing devices, SMPS, Three phase power converters, arcing devices, saturable devices, harmonic distortion of fluorescent lamps,

Modeling of networks and components under non-sinusoidal conditions, transmission and distribution systems, shunt capacitors, transformers, electric machines, ground systems,

UNIT IIIPower quality problems,

Loads that cause power quality problems, power quality problems created by drives and other power system devices and its impact on it. Effect of power system harmonics on power system equipment and loads.

UNIT IVCompensation Techniques:

Power factor improvement, Active Compensation , Passive Compensation, Harmonic Resonance, Active Power Factor Corrected Single Phase Front End, Control
Methods for Single Phase APFC, Three Phase APFC

UNIT V

Grounding and wiring, Different types of neutral grounding, NEC grounding requirements, reasons for grounding, typical grounding and wiring problems, solutions to grounding, and wiring problems.

TEXT BOOKS:

1. Electric power quality by G.T.Heydt
2. Understanding Power Quality Problems by Math H. Bollen

REFERENCES Book :

1. J. Arrillaga, .Power System Quality Assessment., John wiley, 2000
2 J. Arrillaga, B.C. Smith, N.R. Watson & A. R.Wood ,.Power system Harmonic .Analysis, Wiley, 1997

CHHATISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY,BHILAI (C.G.)

Semester : VIIIth **Branch: EEE**

Subject: Smart Grid Systems **Code:325844(25)**

Total Theory Periods: 36 **Total Tutorial Periods: 12**
Total Marks in End Semester Examination: 80

UNIT - I Introduction to Smart Grid

Evolution of Electric Grid, Concept of Smart Grid, Definitions, Need of Smart Grid, Functions of Smart Grid, Opportunities & Barriers of Smart Grid, Difference between conventional & smart grid, Concept of Resilient & Self Healing Grid, Present development & International policies in Smart Grid.Case study of Smart Grid.CDM opportunities in Smart Grid.

UNIT-IISmart Grid Technologies: Part 1

Introduction to Smart Meters, Real Time Prizing, Smart Appliances, Automatic Meter Reading(AMR), Outage Management System(OMS), Plug in Hybrid Electric Vehicles(PHEV), Vehicle to Grid, Smart Sensors, Home & Building Automation, Phase Shifting Transformers.

UNIT-IIISmart Grid Technologies: Part 2

Smart Substations, Substation Automation, Feeder Automation. Geographic Information System(GIS), Intelligent Electronic Devices(IED) & their application for monitoring & protection, Smart storage like Battery, SMES, Pumped Hydro, Compressed Air Energy Storage, Wide Area Measurement System(WAMS), Phase Measurement Unit(PMU).

UNIT-IVMicrogrids and Distributed Energy Resources

Concept of microgrid, need & applications of microgrid, formation of microgrid, Issues of interconnection, protection & control of microgrid. Plastic & Organic solar cells,Thin film solar cells, Variable speed wind generators, fuelcells, microturbines, Captive power plants, Integration of renewable energy sources.

UNIT-VPower Quality Management in Smart Grid

Power Quality & EMC in Smart Grid, Power Quality issues of Grid connected Renewable Energy Sources, Power Quality Conditioners for Smart Grid, Web based Power Quality monitoring, Power Quality Audit.

Text Books:

1. Ali Keyhani, Mohammad N. Marwali, Min Dai "Integration of Green and Renewable Energy in Electric Power Systems", Wiley
2. Clark W. Gellings, "The Smart Grid: Enabling Energy Efficiency and Demand Response", CRC Press

Reference Books:

1. James Northcote, Green, Robert G. Wilson "Control and Automation of Electric Power Distribution Systems (Power Engineering)", CRC Press
   Mladen Kezunovic, Mark G. Adamiak, Alexander P. Apostolov, Jeffrey George Gilbert "Substation Automation (Power Electronics and Power Systems)", Springer
3. Janaka Ekanayake, Nick Jenkins, Kithsiri Liyanage, Jianzhong Wu, Akihiko Yokoyama, "Smart Grid: Technology and Applications", Wiley
4. Jean Claude Sabonnadière, Nouredine Hadjsaïd, "Smart Grids", Wiley Blackwell 19
5. Stuart Borlase, "Smart Grids (Power Engineering)", CRC Press

CHHATISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY,BHILAI (C.G.)

Semester : VIIIth **Branch: EEE/EE**
Subject: VLSI Design **Code:324844(24)**
Total Theory Periods: 36 **Total Tutorial Periods: 12**
Total Marks in End Semester Examination: 80

Course Objectives:

1. To make student familiar with basic design techniques for IC fabrication.
2. Students will understood the significance of various design rule and its implementation for IC design.

Course Outcomes:

1. The knowledge gained by students will helpful to fabrication industries.

Unit-I: Overview of VLSI Design Methodology

VLSI design process-Architectural design-Logical design-Physical design-Layout styles-Full custom-semi custom approaches. Basic Electrical properties of MOS & CMOS circuits: NMOS enhancement transistor- PMOS enhancement transistor-threshold voltage-threshold voltage equations-MOS devices equations-Basic DC equations-Second order effects-MOS modules-small signal AC characteristics -NMOS inverter-Steered input to an NMOS modules-Depletion mode & enhancement mode pull ups-CMOS inverter-DC characteristics-Inverter delay-pass transistor- transmission gate

Unit-II: VLSI Fabrication Techniques

An overview of wafer fabrication -wafer Processing-Oxidation-Patterning- Diffusion -Ion implantation- Deposition-Silicon gate NMOS process-CMOS processes-Nwell-Pwell-Wintub-Silicon on insulator- CMOS process enhancement-Interconnect-Circuit elements.

Unit-III: Layout Design Rules

Need for design rules-Mead Conway design rule for the silicon gate NMOS process-CMOS Nwell/Pwell design rules-Simple layout examples-sheet resistance-area Capacitance-Wiring Capacitance-drive large capacitive loads

Unit-IV: Logic Design

Switch logic-pass transistor & transmission gate-Gate logic-Inverter-two point, NAND gate-NOR gate-other forms of CMOS logic-Dynamic CMOS logic-clocked CMOS logic-Precharged domino CMOS logic-structured design-simple combinational logic design examples-Parity generator-Multiplexes-clocked sequential circuits- two phase clocking-charge storage-dynamic register element-NMOS &CMOS- dynamic shift register-semi static register-JK flip flop circuit.

Unit-V: Subsystem Design Process

Design of a 4 bit shifter-General arrangement of a 4 bit arithmetic processor-Design of a ALU subsystem- Implementing ALU functions with an adder-Carry look ahead adders-Multipliers-serial parallel multipliers- Pipelined multiplier array-Modified Booth's Algorithm

Text Books:

1. Douglas A.Pucknell & Kamran Eshranghian,"Basic VLSI Design", Prentice Hall of India, New Delhi,3rd edition 1994.
2. Neil H.E.West & Kamran Eshranghian,"Principles of CMOS VLSI Design: A system perspective", Addison-Wesley, 2nd edition, 1993.
3. Amar Mukherjee, "Introduction to NMOS & CMOS VLSI system design" Prentice Hall, USA, 1986

Reference books:

1. Caver Mead & Lynn Conway, "Introduction to VLSI system," Addison Wesley.

Eugene D.Fabricus,"Introduction to VLSI design", McGraw Hill International edition, 1990.