3

SCHEME OF TEACHING AND EXAMINATION

B.E. ELECTRICAL & ELECTRONICS EINGINEERING

VIII SEMESTER

Sl. No.	Subject Code	Title of the Subject	Teaching Dept.	Teaching Hrs / Week

Examination
Theory
Practical
Duration
(Hrs)
Marks
IA
Theory / Practical
Total
1
06EE81

Industrial Management, Electrical Estimation and Economics

E&EE

4

-

3

25

100

125

2

06EE82

Power System Operation and Control

E&EE

4
-
3
25
100
125
3
06EE83x
Elective-IV (Group D)
E&EE
4

-
3
25
100
125
4
06EE84x
Elective-V (Group E)
E&EE
4
-
3

25
100
125
5
06EEP85
Project Work
E&EE
-
6
3
100

100
200
6
06EES86
Seminar
E&EE
-
3
-
50
-
50

Total

16

09

15

250

500

750

Elective-IV (Group-D) **Elective-V (Group-E)**

06EE831 - Modern Power System Protection

06EE841 - Power Systems Dynamics and Stability

06EE832 - Electrical Distribution Systems

06EE842 - Electromagnetic Compatibility

06EE833 - Operation Research

06EE843 - Renewable Energy Sources

06EE834 - Programmable Logic Controllers

06EE844 - HVDC Transmission

06EE835 - Software Engineering

06EE845 - Electrical Power Quality

06EE836 - Fixable A.C. Transmission Systems (FACTS)

06EE846 - Computer Control of Electrical Drives

06EE837 - Data communications and Networking

06EE847 - Data Base Management Systems (DBMS)

VIII SEMESTER

INDUSTRIAL MANAGEMENT, ELECTRICAL

ESTIMATION & ECONOMICS

Subject Code	:
06EE81	
IA Marks	:
25	
No. of Lecture Hrs./ Week	:

04		
Exam Hours	:	03
Total No. of Lecture Hrs.	:	52
Exam Marks	:	100

Part - A

UNIT - 1

Personal management: Recruitment and selection, training of personal employer and employee relationship, causes and settlement of disputes.

5 Hours

UNIT - 2

Production Management: Plant location, plant lay-out, CPM and PERT strategies, line balancing, automation, statistical quality control, control chart, motion study.

7 Hours

UNIT – 3

Economics of power factor improvement, Definition of power factor, Factors affecting power factor, Disadvantages of low power factor, Causes of low power factor, Advantages of high power factor, Avoidances of low power factor, Methods of improving power factor, Relative merits and demerits of static and synchronous condensers, Economics of power factor improvement, Advantages of static condensers, Advantages and disadvantages of synchronous condenser, worked examples.□□□□□□□□□□□□□□□□

8 Hours

UNIT - 4

Tariffs: Aim and objectives of Tariffs, factors governing the Tariffs, components of Tariffs, Choice of electrical power supply, Worked examples.

6 Hours

Part - B

UNIT – 5

Choice of plants and economic selection, Factors to be considered in selecting equipment, Methods of selection, Worked examples.

6 Hours

UNIT – 6

Interior wiring system: Wiring system, earthing, and estimation of wiring installation.

6 Hours

UNIT - 7

Power installation: Load calculation, wire size selection, wiring materials for power circuits, and the estimate for motor installation, pump set, workshop, theater etc.,

8 Hours

UNIT - 8

Depreciation and valuation of machinery, Inventory, Economic order quantity, break-even analysis

6 Hours

Text Books:

1. **"Introduction to Management"-**S. S. Chatterjee**,**
2. **"Engineering Economics and Management"** - N. Narasimhaswamy,
3. **"Electrical Estimation and Electrical Wiring Systems"**-Raghavendra Rao.

Reference Book:

"Industrial Organization and Engineering Economics"-T. R. Banga & S. C. Sharma.

POWER SYSTEM OPERATION AND CONTROL

Subject Code	:	**06EE82**
IA Marks	:	

25		
No. of Lecture Hrs./ Week	:	04
Exam Hours	:	03
Total No. of Lecture Hrs.	:	52
Exam Marks		

:

100

Part - A

UNIT - 1

Control center operation of power systems: Introduction to SCADA, control center, digital computer configuration, automatic generation control, area control error, operation without central computers, expression for tie-line flow and frequency deviation, parallel operation of generators, area lumped dynamic model.

8 Hours

UNIT - 2 & 3

Automatic Generation Control: Automatic voltage regulator, automatic load frequency control, A VR control loops of generators, performance of A VR, ALFC of single area systems, concept of control area, multi-area systems, POOL operation-two area systems, tie-line bias control.

10 Hours

UNIT - 4

Control of voltage and Reactive Power: Introduction, generation and absorption of reactive power, relation between voltage, power and reactive power at a node, single machine infinite bus systems, methods of voltage control, sub synchronous resonance, voltage stability, voltage collapse.

8 Hours

Part - B

UNIT - 5

Power System Optimization: Optimal system operation with thermal plants, incremental

production cost for steam power plants, analytical form of generating cost of thermal plants, constraints in economic operation, flow chart, transmission loss as a function of plant generation, the B-coefficients, examples.

8 Hours

UNIT - 6

Unit Commitment: Statement of the problem, need and importance of unit commitment, methods-priority lists method, dynamic programming method, constraints, spinning reserve, and examples.

8 Hours

UNIT - 7 & 8

Power System Security: Introduction, factors affecting power system security, power system contingency analysis, detection of network problems, network sensitivity methods, calculation of network sensitivity factor, cotingency ranking.

10 Hours

Text Books:

1. **"Computer Aided Power System Analysis"-** G.L.Kusic, PHI.
2. **"Modern Power System Analysis"-** I J Nagarath and D P Kothari, TMH, 1993.
3. **"Power generation, operation and control"**- Wood & B A J F Woollenberg. John Wiley and Sons, 1984.
4. **"Electric Power Systems"-**B. M. Weedy,

ELECTIVE-IV (GROUP D)

MODERN POWER SYSTEM PROTECTION

Subject Code	**06EE831**
IA Marks	25

No. of Lecture Hrs./ Week	:	04
Exam Hours	:	03
Total No. of Lecture Hrs.	:	52
Exam Marks	:	

100

PART - A

UNIT - 1

Static Relays: Introduction, Basic construction, Classification, Basic Circuits, Smoothing Circuits, Voltage regulation, square wave Generator, Time delay Circuits, Level Detectors, Summation device, Sampling Circuits, Zero crossing detector, output devices.

8 Hours

UNIT - 2 & 3

Comparators: Replica impedance, Mixing Transformers, General equation of phase and Amplitude, Comparators, Realization of ohm, mho, Impedance and offset impedance characteristics, Duality principle, Static amplifier comparator – Rectifier bridge circulations current type, sampling comparator, static phase comparator coincidence circuits type Rectifier phase comparator, Block split comparator, Zener diode phase comparator,

12 Hours

UNIT - 4

Principles of Digital/ Numerical Relays: Definition of Numerical Protection System, Advantages of Numerical relays, Block diagram of Numerical Relays, Processing Unit, non machines Interface, communication in protective relays, Information handling with sub station monitoring system.

6 Hours

PART - B

UNIT - 5

Static Over Current, Timer And Voltage Relays: Instantanense over current Relay, Definite time lag relay, inverse time over current relay, static timer relay, Basic relay circuits, monostable delay circuits Single phase Instantaneous over voltage and under voltage relays, instantaneous over voltage relay using Op-amp.

10 Hours

UNIT - 6 & 7

Distance Relay: general Principle of operation, Zone discrimination, Fault area on impedance diagram, Basic measuring elements, Different characteristics used in distance relaying- Impedance, Reactance, Admittance. Ohm, Distance relay settings, Distance measurement Problems.

10 Hours

UNIT - 8

Digital Relays: Block Schematic approach of microprocessor based relays, over current relay Protection, Transformer differential protection, Directional relay scheme, Impedance relay scheme.

6 Hours

TEXT BOOKS:

1. **"Power System Protection, Static Relays with Microprocessor applications"-** T.S. Madava Rao, TMH, Second editon, 2004.

2. **"Protective Relays and Protection"** -Van Warrington A. R. and Van C, Vol, I & II Chapman and Hall, 1968.

REFERENCE BOOKS:

1. **"Power System Protection"-**Patra. S.P. Basu. S.K. Choudhari.S. Oxford, and IBH Publications Co-1983.
2. **"Power System Protection and switchgear"-**Ravindranath. B and Chanda M. New age International
3. **"Power system protectonand switchgear"**-B.Ram and D.N Vishwa karma- TMH, 1997.
4. **"Fundamentals of Power System Protection"-** Y.G. pasthankar. S.R. Bhide PHI, 2007.

ELECTRICAL DISTRIBUTION SYSTEM

Subject Code

:

06EE832	
IA Marks	:
25	
No. of Lecture Hrs./ Week	:
04	
Exam Hours	:
03	
Total No. of Lecture Hrs.	:

52

Exam Marks

:

100

Part - A

UNIT - 1

Introduction to power system planning and automation: Factors affecting system planning, present planning techniques, planning models, future trends in planning, systems approach, distribution automation

8 Hours

UNIT - 2

Load characteristic: Basic definition, relation between load and load factor, load growth.

6 Hours

UNIT - 3 & 4

3. System planning: Planning process, planning criteria, system developers, disperced generation, distribution systems, economics and finance, mapping.

12 Hours

Part - B

UNIT - 5 & 6

Design and operation: Engineering design, operation criteria, substation and feeder, voltage control, harmonics, load variations, system losses, energy management.

10 Hours

UNIT - 7

Distribution automation: Definitions, communication, sensors, SCADA.

8 Hours

UNIT - 8

Optimization: Introduction, costing of schemes, typical network configurations, planning terms, network cost modeling, synthesis of optimum line network.

8 Hours

Text Books:

1. **"Electric power distribution system engineering"-**Turan Gonen, Mc GrawHill, 1986.
2. **"Electric power distribution"**-A S. Pabla, TMH, 5th edition, 2004.

OPERATION RESEARCH

Subject Code	: **06EE833**
IA Marks	: 25
No. of Lecture Hrs./ Week	

:

04

Exam Hours

:

03

Total No. of Lecture Hrs.

:

52

Exam Marks

:

100

Part - A

UNIT - 1 & 2

Introduction, definition, OR models characteristics and phases of OR. Modeling with linear programming: Two variable LP model, Graphical LP solution, model in equation form graphical to algebraic solution, simplex method artificial starting solution, Special cases in simplex method, sensitivity analysis.

10 Hours

UNIT - 3

Duality: Definition of the dual problem primal to dual relationships, economic interpretation of duality, additional implex algorithms.

6 Hours

UNIT - 4

Transportation model: definition of transportation model basic feasible solution by different methods, finding optimal solutions, stepping stone method, MODI method, the assignment model, traveling salesman problem.

10 Hours

Part - B

UNIT - 5

Advanced linear programming: revised simplex method, dual simplex method, Bounded variable algorithm, parametric linear programming.

8 Hours

UNIT - 6

Game theory: Formulation of two - person, zero sum games, solving simple games, the Max-min min-max principles, graphical solution procedure, solving by linear programming

8 Hours

UNIT - 7 & 8

PERT & CPM Techniques: Network representation, critical path computation, construction of the time schedule, variation under probabilistic models, crassing of simple networks, PERT calculations.

10 Hours

Text Books:

1. "**Operation Research An Introduction"**-Hamdy A Thoha, Pearson Education, 8th edition,

2007

2. "**Operations Research – Concept and Cases"-**Fredrick S Hillier and Lieverman TMH, 8th edition, 2007.

Reference Book:

1. **"Optimization Techniques"-**S. S. Rao,

PROGRAMMABLE LOGIC CONTROLLERS

Subject Code	:
06EE834	
IA Marks	:
25	
No. of Lecture Hrs./ Week	

:

04

Exam Hours

:

03

Total No. of Lecture Hrs.

:

52

Exam Marks

:

100

PART - A

UNIT - 1

Introdution: Introduction to Programmable logic controller (PLC), role in automation (SCADA), advantages and disadvantages, hardware, internal architecture, sourcing and sinking, characteristics of I/O devices, list of input and output devices, examples of applications. I/O processing, input/output units, signal conditioning, remote connections, networks, processing inputs I/O addresses.

7 Hours

UNIT - 2

rogramming: Ladder programming- ladder diagrams, logic functions, latching, multiple outputs, entering programs, functional blocks, programme examples like location of stop and emergency switches

8 Hours

UNIT - 3 & 4

Programming languages: Instruction list, sequential functions charts & structured text, jump and call subroutines .

10 Hours

Part - B

UNIT - 5

Internal relays: ladder programmes, battery- backed relays, one - shot operation, set and reset, master control relay.

5 Hours

UNIT - 6 & 7

Timers and counters: Types of timers, programming timers, ON and OFF- delay timers, pulse timers, forms of counter, programming, up and down counting, timers with counters, sequencer.

12 Hours

UNIT - 8

Shift register and data handling: shift registers, ladder programs, registers and bits, data handling, arithmetic functions, temperature control and bottle packing applications.

10 Hours

Note: Discussing the programming should be restricted to only one type of PLC (Mitsubhishi)

Text Books:

1. **"Programmable Logic controllers"-**W Bolton, 4th edition, Elsevier- newness, 2006.
2. **"Programmable logic controllers - principles and applications"-**John W Webb, Ronald A Reis,

-

5th

edition, 2

nd

impression, Pearson

education, 2007.

Reference Books:

1. **"Programmable Controller Theory and Applications**"-L. A Bryan, E. A Bryan, -2nd edition, An industrial text company publication, 1997.

2. **"Programmable Controllers – An Engineers Guide"**-E. A Paar, 3rd edition, newness, 2003.

SOFTWARE ENGINEERING

Subject Code

:

06EE835

IA Marks	
:	
25	
No. of Lecture Hrs./ Week	
:	
04	
Exam Hours	
:	
03	
Total No. of Lecture Hrs.	
:	
52	

Exam Marks

:

100

PART - A

UNIT - 1

OVERVIEW: Introduction to software engineering

Software processes: software processes, Model process, iteration, software specification, software design and implementation software validation, software evolution, automated process support.

6 Hours

UNIT - 2 & 3

REQUIREMENTS ENGINEERING:

Software Requirements: Functional and non-functional requirements, user requirements, system requirements, the software-required documents.

Requirements of Engineering: processes feasibility studies, requirements elicitation and analysis, requirements validation, requirement, requirements management.

System Model: Context Model, Behavior Models, Data Models, Object models, CASE workbench

Software Prototyping: Prototyping in Software Processes, Rapid Prototyping Technique, and User-Interface Prototyping.

12 Hours

UNIT - 4

SOFTWARE DESIGN:

Architectural Design: System Structuring, Control Models, Modular Decomposition, And Domain Specific architecture.

Object Oriented Design: Object and Object Classes, An object oriented design process, Design Evolution.

User Interface Design: User interface design principles, User Interaction, Information Presentation User Support, Interface Evaluation.

10 Hours

PART - B

UNIT - 5

VERIFICATION VALIDATION:

Verification and validation Planning, Software Inspection, Automated Static Analysis, Clean Room Software Development.

Software Testing: Defect Testing, Integration Testing, Object oriented testing, testing workbenches.

7 Hours

UNIT - 6

CRITICAL SYSTEM:

Critical System: Critical System, Availability and Reliability, Safety and Security.

Critical System Specification: Software reliability specification, Safety Specification.

4 Hours

UNIT - 7

SOFTWARE MANAGEMENT:

Project Management: Management Activities, Project Planning, Project Scheduling, and Risk Management.

Software Cost Estimation: Productivity, Estimation Techniques, Algorithmic Cost Modeling, Project Duration and staffing.

Quality Management: Quality Assurance and standards, Quality Planning, Quality Control, Software Measurements and Metrics.

9 Hours

UNIT - 8

SOFTWARE EVOLUTION:

Legacy System: Legacy System Structure, Legacy System Design and Assessment.

Software Re-Engineering: Source Code Translation, Reverse Engineering, Program Structure Improvement, and Program Modularization, Data Re-engineering.

4 Hours

Text Book:

1. **"Software Engineering"-**an Sommerville**,** 7th Edition, Pearson education, 2005.

Reference Books:

1. **"Software Engineering – A Practitioners Approach"-**ogers S.Pressen. TMH, 6th Edition, 2007

2. **"An Integrated Approach to Software Engineering"-**Pankaj Jalote, Narosa Publication.

3. **"Object Oriented & Classical software Engineering"-**Stephen R. Schach**,** TMH, Indian edition, 2007.

FLEXIBLE AC TRANSMISSION SYSTEMS (FACTS)

Subject Code	:	**06EE836**
IA Marks	:	

25	
No. of Lecture Hrs./ Week	
:	
04	
Exam Hours	
:	
03	
Total No. of Lecture Hrs.	
:	
52	
Exam Marks	

:

100

Part - A

UNIT - 1 & 2

Facts, Concepts and general system configuration. Transmission, interconnection, flow of power in AC system, power flow and dynamic stability consideration, of a transmission interconnection, relative importance of controllable parameters, basic types of FACTs controllers, shunt, series, combined shunt and series connected controllers.

10 Hours

UNIT - 3

Power semiconductor devices: types of high power devices, principle of high power device characteristics and requirements, power device material, diode, MOSFET, MOS turn OFF thryrirstor, emitter turn OFF thryristor, integrated gate commuted thyristor (GCT & IGCT).

10 Hours

UNIT - 4

Voltage sourced converters: basic concepts, single phase full wave bridge converter operation, square wave voltage harmonics for a single phase bridge 3 phase full wave bridge converter.

6 Hours

Part - B

UNIT - 5

Self and line commutated current source converter: basic concepts, 3 phase full wave diode rectifier, thyristor based

converter, current sourced converter with turnoff devices, current sourced versus voltage source converter.

6 Hours

UNIT - 6

Static shunt compensatorSVC and STATCOM: objective of shunt compensation, methods of controllable Var generation, static Var compensator, SVC and STATCOM, comparison between, SVCandSTATCOM.

10 Hours

UNIT - 7 & 8

Static series compensators: GCSC, TSSC, TCSC and SSSC, objectives of series compensation; variable impedance type of series compensation, switching converter type series compensation, external control for series reactive compensators.

10 Hours

Text Book:

1. **"Understanding Facts - Concepts and technology of flexible AC Transmission system"-** Narayan Hungorian & Laszlo gyugyi IEEE Press, standard publisher, 2001.

Reference Book:

1. **"EHV – AC, HVDC Transmission & Distribution Engineering" 3rd edition-**S. Rao Khanna publishers, 2003.

DATA COMMUNICATION AND NETWORKING

Subject Code

:

06EE837

IA Marks

:

25

No. of Lecture Hrs./ Week

:

04

Exam Hours

:

03

Total No. of Lecture Hrs.

:

52

Exam Marks

:

100

Part - A

UNIT - 1

Intorduction: Data Communication, Data representation, Data Flow,

4 Hours

Networks: Network Criteria's, Physical Strictures, Physical Topology, Network Models, LAW

VAN MAN Internet, Protocol & Standers.

6 Hours

UNIT - 2

Network Models: Layered Tasks Layers in OSI Model TCI Protocol Suite Addressing. Physical Layer and Media- Data & Signal Analog & Digital Signal Transmission inspiration Data rate limits, performance

8 Hours

UNIT - 3

Digital transmission: Digital to digital conversion analog to digital conversion, Transmission modes.

4 Hours

UNIT - 4

Analog transmission: digital to analog conversion and analog to anlog conversion band width utilization y multiplexing.

4 Hours

Part - B

UNIT - 5

Transmission media: guided media, wireless, the medium access sub layers aloma protocols, LAN protocols IEEE standard 802 Ethernet LAN fiber optic networks, satellite network pocket radio network

8 Hours

UNIT - 6

The data link layer: Introduction types of error, reducing detection verses correction, elementary data link protocols performance sliding window protocol

6 Hours

UNIT - 7

The network layer Internetworking, datagram containerless network conjession control open & close loop conjession control tropic shaping leakay bucket token bucket algorithems interact as datagram network and connection less network

8 Hours

UNIT - 8

Transport Layer: Process to process layer delivery claint server pardiagam connection less verses connection orient user data gram protocall (UDP) UDP operation TCP services and features.

4 Hours

Text Books:

1. **"Data Communication And Networking"-** 4th edition, Beurouz Fafrouz Zan,
2. **"Computer Networks"** - Tanenbaum, PHI 3rd edition, Pearson

Reference Books:

1. **"Network for Computer Scientist And Engineers"-**Youn Zhen, Oxford press 2002.
2. "**Data & Computer Networks"**U Stallings, 5th edition, PHI 1998.
3. **"Computer Networks"-** James F Kurose and K W Ross, Pearson.

ELECTIVE -V (GROUP – E)

POWER SYSTEM DYNAMICS AND STABILITY

Subject Code

:

06EE841

IA Marks	
:	
25	
No. of Lecture Hrs./ Week	
:	
04	
Exam Hours	
:	
03	
Total No. of Lecture Hrs.	
:	
52	

Exam Marks

:

100

Part - A

UNIT - 1

Introduction: Basic concepts, Review of classical methods.

2 Hours

UNIT - 2 & 3

System Modeling and Dynamics of Synchronous Generator: Modeling of synchronous machine, Swing equation, Park's transformation – Park's voltage equation, Park's mechanical equation (torque). Applications – (a) Voltage build up in synchronous machine, and (b) Symmetrical short circuit of generator. Solution for transient analysis, Operational impedance, Relationship between Tdo/ and Tdo//, Algebraic constraints.

14 Hours

UNIT - 4

Excitation and Prime mover controllers: Introduction, Types of excitation, AVR with and without ESS, TGR, Amplifier PSS, Static exciters.

8 Hours

Part - B

UNIT - 5

Modeling of Prime Movers: Introduction, Three major components, Block diagram, Hydraulic

turbine, Steam turbine.

8 Hours

UNIT - 6

Load Modeling: Introduction, Two approaches – Polynomial model and Exponential model. Small Signal Angle Stability: Small signal angle stability with SMIB system, detailed model of SMIB.

10 Hours

UNIT - 7 & 8

Transient Stability Analysis: Simulation for Transient stability Evaluation, Transient stability controllers.

10 Hours

Text Books:

1. **"Power System Dynamics, Stability and Control"**-Padiyar K.R., Interline Publications.

2. "**Power System Stability and Control"-** Prabha Kundur. McGraw-Hill Publishing Company, NY.

Reference BOOKs:

1. **"Dynamics and Control of Large Electric Power Systems"-** Marija Ilic; John Zaborszky, , IEEE Press and John Wiley & Sons, Inc.

2. **"Power System Control and Stability Revised Printing"-**Paul M. Anderson and A. A. Fouad, IEEE Press and John Wiley & Sons, Inc.

3. Selected topics from IEEE Transaction and Conference Proceedings.

ELECTROMAGNETIC COMPATIBILITY

Subject Code

:

06EE842

IA Marks

:

25

No. of Lecture Hrs./ Week

:

04

Exam Hours

:

03

Total No. of Lecture Hrs.

:

52

Exam Marks

:

100

Part - A

UNIT - 1

Introduction: Designing of electromagnetic compatibility, EMC regulation, typical noise path, and use of network theory, method of noise coupling, miscellaneous noise sources, and method of eliminating interference.

8 Hours

UNIT - 2 & 3

Cabling: Capacitive coupling, effect of shield on magnetic coupling, mutual inductance calculations, magnetic coupling between shield and inner conductor, shielding to prevent magnetic radiation, shielding a receptor against magnetic fields, shield transfer impedance, experimental data, example of selective shielding, co-axial cable versus shielded twisted pair braided shields, effect of pig tails, ribbon cable, electrically long cables.

10 Hours

UNIT - 4

Grounding: Safety grounds, signal grounds, single point ground systems, hybrid grounds, multipoint ground systems, functional ground layout, practical low frequency grounding, hardware grounds, single ground reference for a circuit amplifier shields, grounding of cable shields, ground loops, low frequency analysis of common mode choke, high frequency analysis of common mode choke, differential amplifiers, shields grounding at high frequencies, guard shields guarded meters.

10 Hours

Part - B

UNIT - 5

Balancing and Filtering: Balancing, power supply decoupling, decoupling filters, amplifier decoupling driving capacitive loads, high frequency filtering, system bandwidth, and modulation and coding.

8 Hours

UNIT - 6 & 7

Shielding: Near field and far fields, characteristic and wave impedance's shielding effectiveness, absorption loss, reflection loss, composite adsorption and reflection loss, summary of shielding equation, shielding with magnetic material, experimental data, apertures, wave guide below cutoff, conductive gaskets, conductive windows, conductive coatings, cavity resonance, brooding of shields.

10 Hours

UNIT - 8

Electrostatic discharge: State generation, human body model, static discharge, and ESD protection in equipment design, software and ESD protection, ESD versus EMC.

6 Hours

Text Book:

1. **"Noise reduction techniques in electronic systems"**- 2nd edition, Henry W. Ott, John Wiley, 1988

RENEWABLE ENERGY SOURCES

Subject Code

:

06EE843

IA Marks

:

25

No. of Lecture Hrs./ Week

:

04

Exam Hours

:

03

Total No. of Lecture Hrs.

:

52

Exam Marks

:

100

PART - A

UNIT - 1

Energy Sources: Introduction, Importance of Energy Consumption as Measure of Prosperity, Per Capita Energy Consumption, Classification of Energy Resources; Conventional Energy Resources - Availability and their limitations; Non-Conventional Energy Resources – Classification, Advantages, Limitations; Comparison of Conventional and Non-Conventional Energy Resources; World Energy Scenario; Indian Energy Scenario.

4 Hours

UNIT - 2

Solar Energy Basics: Introduction, Solar Constant, Basic Sun-Earth Angles – definitions and their representation, Solar Radiation Geometry (numerical problems), Estimation of Solar Radiation of Horizontal and Tilted Surfaces (numerical problems); Measurement of Solar Radiation Data – Pyranometer and Pyrheliometer.

6 Hours

UNIT - 3

Solar Thermal Systems: Principle of Conversion of Solar Radiation into Heat, Solar Water Heaters (Flat Plate Collectors), Solar Cookers – Box type, concentrating dish type, Solar driers, Solar Still, Soalr Furnces, Solar Green Houses

6 Hours

UNIT - 4

Solar Electric Systems: Solar Thermal Electric Power Generation – Solar Pond and Concentrating Solar Collector (parabolic trough, parabolic dish, Central Tower Collector). Advantages and Disadvantages; Solar Photovoltaic – Solar Cell fundamentals, characteristics,

classification, construction of module, panel and array. Solar PV Systems – stand-alone and grid connected; Applications – Street lighting, Domestic lighting and Solar Water pumping systems.

7 Hours

Energy Storage: Introduction, Necessity of Energy Storage, and Methods of Energy Storage (classification and brief description using block diagram representation only).

3 Hours

PART - B

UNIT - 5

Wind Energy: Introduction, Wind and its Properties, History of Wind Energy, Wind Energy Scenario – World and India. Basic principles of Wind Energy Conversion Systems (WECS), Classification of WECS, Parts of a WECS, Derivation for Power in the wind, Electrical Power Output and Capacity Factor of WECS, Wind site selection consideration, Advantages and Disadvantages of WECS.

8 Hours

UNIT - 6

Biomass Energy: Introduction, Photosynthesis process, Biomass fuels, Biomass conversion technologies, Urban waste to Energy Conversion, Biomass Gasification, Biomass to Ethanol Production, Biogas production from waste biomass, factors affecting biogas generation, types of biogas plants – KVIC and Janata model; Biomass program in India.

6 Hours

UNIT - 7

Energy from Ocean: Tidal Energy – Principle of Tidal Power, Components of Tidal Power Plant (TPP), Classification of Tidal Power Plants, Estimation of Energy – Single basin and Double basin type TPP (no derivations. Simple numerical problems), Advantages and Limitation of TPP. Ocean Thermal Energy Conversion (OTEC): Principle of OTEC system, Methods of OTEC power generation – Open Cycle (Claude cycle), Closed Cycle (Anderson cycle) and Hybrid cycle (block diagram description of OTEC); Site-selection criteria, Biofouling, Advantages & Limitation of OTEC.

6 Hours

UNIT - 8

Emerging Technologies: Fuel Cell, Small Hydro Resources, Hydrogen Energy, and Wave Energy. (Principle of Energy generation using block diagrams, advantages and limitations).

1.

6 Hours

Text Books:

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1. **"Non-Conventional Sources of Energy"- 4th Edition,** Rai, G. DKhanna Publishers, New Delhi, 2007
2. **"Non-Conventional Energy Resources"-** Khan, B. H., TMH, New Delhi, 2006.

Reference Book:

1. **"Fundamentals of Renewable Energy Systems"** Mukherjee, D., and Chakrabarti, S., New Age International Publishers, 2005.

HVDC TRANSMISSION

Subject Code	
:	
06EE844	
IA Marks	
:	
25	
No. of Lecture Hrs./ Week	
:	
04	
Exam Hours	
:	
03	

Total No. of Lecture Hrs.

:

52

Exam Marks

:

100

PART - A

UNIT - 1 & 2

General aspects of DC transmission and comparison of it with Ac transmission: Historic al sketch, constitution of EHV AC and DC links, Limitations and Advantages of AC and DC Transmission

.

12 Hours

UNIT - 3 & 4

Converter circuits: Valve Characteristics, Properties of converter circuits, assumptions, single phase, three phase converters, choice of best circuits for HV DC circuits

12 Hours

PART - B

UNIT - 5

Analysis of the bridge converter: Analysis with grid control but no over lap, Analysis with grid control and with over lap less than 60 deg, Analysis with overlap greater than 60 deg, complete characteristics of rectifier, Inversion

10 Hours

UNIT - 6 & 7

Control of HVDC converters and systems: grid control, basic means of control, power reversal, limitations of manual control, constant current versus constant voltage, desired feature of control, actual control characteristics, constant -minimum -Ignition –angle control, constant –current control, constant –extinction –angle control, stability of control

10 Hours

UNIT - 8

Protection: General, DC reactor, voltage oscillations and valve dampers, current oscillations and anode dampers, DC line oscillations and line dampers, clear line faults and reenergizing the line.

8 Hours

Text Books:

1. **"Direct current Transmission"-**EW Kimbark,
2. **"Power system stability and control"-** Prabha Kundur, TMH, 9th reprint, 2007.

ELECTRICAL POWER QUALITY

Subject Code	**06EE845**
IA Marks	25
No. of Lecture Hrs./ Week	

04	
Exam Hours	
:	
03	
Total No. of Lecture Hrs.	
:	
52	
Exam Marks	
:	
100	

PART - A

UNIT - 1

Introduction, Power quality-voltage quality, power quality evaluation procedures Term and Definitions: general classes of power quality problems, Transients, long duration voltage variation, short duration voltage variations, voltage imbalance, waveform distortion, power quality terms.

8 Hours

UNIT - 2

Voltage sags and interruptions: Sources of sags and interruptions, estimating voltage sag performance, fundamental principles of protection, monitoring sags.

6 Hours

UNIT - 3 & 4

Transients over voltages: Sources of transient over voltages, principles of over voltages protection, utility capacitor switching transients, Fundamentals of harmonics: Harmonic distortion, voltage versus transients, harmonic indexes, harmonic sources from commercial loads, harmonic sources from Industrial loads, effects of harmonic distortion, intraharmonics

10 Hours

PART - B

UNIT - 5

Applied harmonics: Harmonic distortion evaluations, principles for controlling harmonics, harmonic studies, devices for controlling harmonic distortion, harmonic filters, standards of harmonics

10 Hours

UNIT - 6

Power quality benchmark: introduction, benchmark process, power quality contract, power quality state estimation, including power quality in distribution planning, Interface to utility system, power quality issues, interconnection standards

10 Hours

UNIT - 7 & 8

Power quality monitoring: Monitoring considerations, power quality measurement equipments, assement of power quality measurement data, application of intelligent systems, power quality monitoring standards.

8 Hours

Text Book:

1. **"Electric Power Quality"-**Dugan, Roger C, Santoso, Surya, McGranaghan, Mark F/ Beaty, H. Wayne McGraw-Hill professional publication 2003.

Reference Books:

1. **"Electric Power Quality" -** G.T.Heydt, stars in a circle publications 1991.

2. **"Modern Power Electronics"-** M.H.Rashid TATA McGraw Hill 2002.

3. **"Understanding power quality problems voltage sags and interruptions"-**Math H. J. Bollen. IEEE Press, 2000.

COMPUTER CONTROL OF ELECTRICAL DRIVES

Subject Code	:
06EE846	
IA Marks	:
25	
No. of Lecture Hrs./ Week	:

04	
Exam Hours	
:	
03	
Total No. of Lecture Hrs.	
:	
52	
Exam Marks	
:	
100	

Part - A

UNIT - 1

Review of Micro controllers in industrial drives system: Typical Micro controller's 8 bit 16 bit (only block diagram) Digital Data Acquisition system, voltage sensors, current sensors, frequency sensors and speed sensors.

4 Hours

UNIT - 2

Evolution of power electronics in drives: Power semiconductors devices used for drives control, GTO, BJT, power MOSFET, IGBT, MCT and IGCT structures, Ratings, comparison and their applications. Block diagram of power integrated circuit for D C motor drives.

4Hours

UNIT - 3

A C Machine Drives: general classification and National Electrical Manufacturer Assocition (NEMA) classification, Speed control of Induction motors with variable voltage constant frequency, constant voltage variable frequency, (v/f) constant operation, drive operating regions. Variable stator current operation. Effect of Harmonics.

9 Hours

UNIT - 4

Synchronous Machine drives: Wound field machine, comparison of Induction and wound field synchronous machines, Torque angle characteristics of salient pole synchronous machines, synchronous reluctance permanent magnet synchronous machines (SPM), variable reluctance machines (VRM).

8 Hours

Part - B

UNIT - 5

Phase controlled converters: Converter controls, Linear firing angle control, cosine wave crossing control, phase locked Oscillator principle, Electrro magnetic Interference (EMI) and line power quality problems, cyclo converters, voltage fed converters, Rectifiers, Current fed converters.

7 Hours

UNIT - 6

Principals of slip power recovery schemes: Static Kramer's drive system, block schematic diagram, phasor diagram and limitations, Static Scherbins scheme system using D.C link converters with cyclo converter modes of operation, modified Scherbins Drive for variable source, constant frequency (VSCF) generation

6 Hours

UNIT - 7

Principle of vector control of A C drives: Phasor diagram, digital Implementation block diagram, Flux vector estimation, indirect vector control block diagram with open loop flux control, synchronous motor control with compensation.

6 Hours

UNIT - 8

Expert system Application to Drives (only block diagram): Expert system shell, Design methodology, ES based P-I tuning of vector controlled drives system, Fuzzy logic control for speed controller in vector control drives,, structure of fuzzy control in feedback system.

8 Hours

TEXT BOOKS:

1. **"Power Electronics & Motor Drives"-**Bimal Bose, Elsevier 2006

2. **"Modern Power Electronics & Drives"-**Bimal K. Bose, Pearson Education 2003.

Reference BOOK:

1. **"Advanced Microprocessor and Interfacing"-** Badri Ram TMH,

DATA BASE MANAGEMENT SYSTEMS (DBMS)

Subject Code	**06EE847**
IA Marks	25
No. of Lecture Hrs./ Week	04

Exam Hours	
:	
03	
Total No. of Lecture Hrs.	
:	
52	
Exam Marks	
:	
100	

PART - A

UNIT - 1

Introduction to data base systems: Managing data, a historical perspective, File systems versus DBMS, Advantages of DBMS, Describing and Storing Data in DBMS, Queries in DBMS, Transaction management, Structure of DBMS, People who work with databases.

4 Hours

UNIT - 2

Entity – relationship model: Using high-Level Conceptual Data Models for Database Design, An example of Database Application, Entity types, Entity Sets, Attributes and Keys, Relationship types, Relationship Sets, Roles and Structural Constraints, Weak Entity Types, Refining the ER Design for the COMPANY database, ER Diagrams, Naming Conventions and Design Issues

5 Hours

UNIT - 3

Relational model and relational algebra: Relational model concepts, relational model constraints and relational database schemes, update operations and dealing with Constraint Violations, Unary relational Operations, SELECT and PROJECT, Relational Algebra Operations

from Set Theory, Binary Relational Operations, JOIN and DIVISION, Additional Relational Operations, examples of Queries in Relational algebra, relational database design using ER – to-Relational mapping

8 Hours

UNIT - 4

SQL-The Relational Database standard: SQL Data definition and data types, specifying basic constraints in SQL, Schemes, Change statements in SQL, basic Queries in SQL, more complex SQL queries, Insert, Delete and update statements in SQL, additional features of SQL, specifying general constraints as assertion, views (virtual tables) in SQL, database Programming, issues and Techniques, Embedded SQL, Dynamic SQL.
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9 Hours

PART - B

UNIT - 5

Database Design: Informal Design Guidelines for Relation Schemes, Functional Dependencies, Normal Forms based on Primary Keys, General Definitions of Second and Third Normal Forms, Boyce-Codd Normal Form, Properties of Relational Decompositions, Algorithms for Relational Database Scheme Design, Multivalued Dependencies and Fourth Normal Form, Join Dependencies and Fifth Normal Form, Inclusion Dependencies, Other Dependencies and Normal Forms.

10 Hours

UNIT - 6

Database Security: Introduction Security, Access control, Discretionary Access, Mandatory Access Control

3 Hours

UNIT - 7 & 8

Transaction Management: The ACID properties, Transactions and Schedules, Concurrent Execution of transactions, Lock-based Concurrency control, performance of locking, Transaction support In SQL, Introduction to crash recovery; 2PL, ss for 4rializability and recoverability, Introduction to lock management, Lock Conversions, Dealing with Deadlocks, Specialized locking Techniques, Concurrency control without locking, Introduction to ARIES, The log, Other Recovery related Data Structures, The write-ahead log Protocol, Check pointing, Recovering from a System Crash, Media Recovery, Other Algorithms and Interaction with Concurrency control.

13 Hours

Text Books:

1. **"Database Management Systems"** 3rd Edition, Raghu Ramakrishnan and Johannes Gehrke, McGraw Hill, 2003.

2. **"Fundamentals of Database Systems"-**Elmasri and Navathe**,** 4th Edition, Pearson Education, 2003.