Annexure-III

NEE701/NEN 701: ELECTRIC DRIVES

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Unit 1:

Fundamentals of Electric Drive:

Electric Drives and its parts, advantages of electric drives Classification of electric drives Speed-torque conventions and multi-quadrant operations Constant torque and constant power operation Types of load Load torque: components, nature and classification

Unit 2:

Dynamics of Electric Drive:

Dynamics of motor-load combination Steady state stability of Electric Drive Transient stability of electric Drive

Selection of Motor Power rating:

Thermal model of motor for heating and cooling, classes of motor duty, determination of motor power rating for continuous duty, short time duty and intermittent duty. Load equalization

Unit 3:

Electric Braking:

Purpose and types of electric braking, braking of dc, three phase induction and synchronous motors

Dynamics During Starting and Braking:

Calculation of acceleration time and energy loss during starting of dc shunt and three phase induction motors, methods of reducing energy loss during starting. Energy relations during braking, dynamics during braking

Unit 4:

Power Electronic Control of DC Drives:

Single phase and three phase controlled converter fed separately excited dc motor drives (continuous conduction only), dual converter fed separately excited dc motor drive, rectifier control of dc series motor. Supply harmonics, power factor and ripples in motor current Chopper control of separately excited dc motor and dc series motor.

Unit 5:

Power Electronic Control of AC Drives and Three Phase induction Motor Drive:

Static Voltage control scheme, static frequency control scheme (VSI, CSI, and cyclo – converter based) static rotor resistance and slip power recovery control schemes.

Three Phase Synchronous motor:

Self controlled scheme

Special Drives:

Switched Reluctance motor, Brushless dc motor. Selection of motor for particular applications

Text Books:

1. G.K. Dubey, “Fundamentals of Electric Drives”, Narosa publishing House.
2. S.K.Pillai, “A First Course on Electric Drives”, New Age International.
3. B.N. Sarkar, “Fundamental of Industrial Drives”, Prentice Hall of India Ltd.

Reference Books:

1 M.Chilkin, “Electric Drives”,Mir Publishers, Moscow.

2 Mohammed A. El-Sharkawi, “Fundamentals of Electric Drives”, Thomson Asia, Pvt. Ltd. Singapore.
3 N.K. De and Prashant K.Sen, “Electric Drives”, Prentice Hall of India Ltd.
4 V.Subrahmanyam, “Electric Drives: Concepts and Applications”, TataMcGraw Hill.

NEE 702/NEN702: POWER STATION PRACTICE

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UNIT-I:

Introduction: Electric energy demand and growth in India, electric energy sources.

Thermal Power Plant:Site selection, general layout and operation of plant, detailed description and use of different parts.

Hydro Electric Plants:Classifications, location and site selection, detailed description of various components, general layout and operation of Plants, brief description of impulse, reaction, Kaplan and Francis turbines, advantages & disadvantages, hydro-potential in India

UNIT-II:

Nuclear Power Plant:Location, site selection, general layout and operation of plant. Brief description of different types of reactors Moderator material, fissile materials, control of nuclear reactors, disposal of nuclear waste material, shielding.

Gas Turbine Plant:Operational principle of gas turbine plant & its efficiency, fuels, open and closed-cycle plants, regeneration, inter-cooling and reheating, role and applications.

Diesel Plants:Diesel plant layout, components & their functions, its performance, role and applications

UNIT-III:

Sub-stations Layout:

Types of substations, bus-bar arrangements, typical layout of substation.

Power Plant Economics and Tariffs: Load curve, load duration curve, different factors related to plants and consumers, Cost of electrical energy, depreciation, generation cost, effect of Load factor on unit cost. Fixed and operating cost of different plants, role of load diversity in power system economy. Objectives and forms of Tariff; Causes and effects of low power factor, advantages of power factor improvement, different methods for power factor improvements.

UNIT-IV:

Economic Operation of Power Systems:

Characteristics of steam and hydro-plants,Constraints in operation, Economic load scheduling of thermal plants Neglecting and considering transmission Losses, Penalty factor, loss coefficients, Incremental transmission loss. Hydrothermal Scheduling

UNIT-V:

Non Conventional Energy Sources:

Power Crisis, future energy demand, role of Private sectors in energy management, concepts & principals of MHD generation,Solar power plant,Wind Energy,Geothermal Energy,Tidal energy,Ocean Thermal Energy.

Text Books:

1. B.R. Gupta,"Generation of Electrical Energy", S. Chand Publication.
2. Soni, Gupta & Bhatnagar, "A text book on Power System Engg.", Dhanpat Rai & Co.
3. P.S.R. Murthy, "Operation and control of Power System" BS Publications, Hyderabad.

Reference Books:

4. W. D. Stevenson, “Elements of Power System Analysis”, McGraw Hill.
5. S. L. Uppal, “Electrical Power”, Khanna Publishers.

NEC 702: ANALOG & DIGITAL COMMUNICATION

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Unit 1:
Elements of communication system and its limitations Amplitude Modulation: Amplitude modulation and detection, Generation and detection of DSB-SC, SSB and vestigial side band modulation, carrier acquisition AM transmitters and receivers, super hetrodyne receiver, IF amplifiers, AGC circuits Frequency Division multiplexing

Unit 2:
Angle Modulation: Basic definitions Narrow band and wideband frequency modulation, transmission bandwidth of FM signals Generation and detection of frequency modulation Noise : External noise, internal noise Noise calculations, signal to noise ratio Noise in AM and FM systems

Unit:3
Pulse Modulation: Introduction, sampling process Analog Pulse Modulation Systems-Pulse Amplitude Modulation, Pulse width modulation and Pulse Position Modulation. Waveform coding Techniques: Discretization in time and amplitude, Quantization process, quantization noise, Pulse code Modulation, Differential Pulse code Modulation, Delta Modulation and Adaptive Delta Modulation.

Unit:4
Digital Modulation Techniques: Types of digital modulation, waveforms for amplitude, frequency and phase shift keying, methods of generation of coherent and noncoherent, ASK,FSK and PSK, comparison of above digital techniques.

Unit:5
Time Division Multiplexing: Fundamentals, Electronic Commutator, Bit/byte interleaving, TI carrier system, synchronization and signaling of TI, TDM and PCM hierarchy, synchronization techniques Introduction to Information Theory: Measure of information, Entropy & Information rate, channel capacity, Hartley Shannan law, Huffman coding, shannan Fano coding.

Text Books:
1.Simon Haykin," Communication Systems" John Wiley & Sons 4th Edition
2.G.Kennedy and B. Davis,"Electronic Communication Systems" 4th Edition, Tata McGraw Hill 3. Simon Haykin, "Digital Communications" John Wiley & Sons
4. T.L. Singal,"Analog & Digital Communication", Tata Mc Graw Hill

Reference Books:
1.B.P. Lathi, "Modern Analog & Digital Communication Systems" Oxford University Press. 2.Taub & Schilling, "Communication System: Analog and Digital" Tata Mc Graw Hill 3.R.P.Singh & S.D. Sapre, "Communication Systems Analog and Digital" Tata McGraw Hill.

NEE –031/NEN-031: POWER SYSTEM OPERATION AND CONTROL

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UNIT-I

Introduction :

Structure of power systems,Power system control center and real time computer control, SCADA system Level decomposition in power system Power system securityVarious operational stages of power system Power system voltage stability

UNIT-II

Economic Operation :

Concept and problems of unit commitment Input-output characteristics of thermal and hydro-plants System constraints Optimal operation of thermal units without and with transmission losses, Penalty factor,incremental transmission loss, transmission loss formula (without derivation)Hydrothermal scheduling long and short terms Concept of optimal power flow

UNIT-III

Load Frequency Control :

Concept of load frequency control,Load frequency control of single area system:
Turbine speed governing system and modeling, block diagram representation of single area system, steady state analysis, dynamic response, control area concept, P-I control, load frequency control and economic dispatch control.Load frequency control of two area system:Tie line power modeling, block diagram representation of two area system, static and dynamic response

UNIT-IV

Automatic Voltage Control :

Schematic diagram and block diagram representation, different types of Excitation systems & their controllers.

Voltage and Reactive Power control :

Concept of voltage control, methods of voltage control-control by tap changing transformer. Shunt Compensation, series compensation, phase angle compensation

UNIT-V

State Estimation:Detection and identification, Linear and non-linear models.

Flexible AC Transmission Systems:

Concept and objectives FACTs controllers: Structures & Characteristics of following FACTs Controllers. TCR,FC-TCR, TSC, SVC, STATCOM, TSSC, TCSC, SSSC, TC-PAR, UPFC

Text Books:

1. D.P. Kothari & I.J. Nagrath, "Modern Power System Analysis" Tata Mc Graw Hill, 3rd Edition.
2. P.S.R. Murty, "Operation and control in Power Systems" B.S. Publications.
3. N. G. Hingorani & L. Gyugyi, " Understanding FACTs" Concepts and Technology of Flexible AC Transmission Systems"
4. A. J. Wood & B.F. Wollenburg, " Power Generation, Operation and Control " John Wiley & Sons.

Reference Books:

1. O.I. Elgerd, "Electric Energy System Theory" Tata McGraw Hill.
2. P. Kundur, " Power System Stability and Control Mc Graw Hill.
3 . T. K. Nagsarkar & M.S.Sukhiza,' Power System Analysis' Oxford University Press.

NEE-032/NEN032:
ADVANCED MICROPROCESSORS AND MICROCONTROLLERS

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Unit-I
Mode of operation of higher order processors: Real mode and protected mode Real mode and protected mode memory addressing, access right byte, Memory paging, System descriptors, Multi Tasking & TSS.

Unit-II
Instruction Set of higher order processors(8086 to Pentium):
Comparison with 8086 in real mode: Generalized instruction set format Addressing Mode: DRAM & BRAM Categorization of instruction set of INTEL processors.
Integer instructions: Data transfer instructions, arithmetic and logical operations, string instructions, branch control instructions, procedure call instruction and return instruction.

Unit-III
Processing of CALLS, INTERRUPTS & EXCEPTIONS: Privilege levels; ENTER and LEAVE Instructions,INT N. IRET. Interrupt processing sequence, Protected mode interrupts.

Unit-IV
Assembly Level Programming: ROM BIOS Routines, MS DOS BIOS Routines, Assembling a progam using Assembler, exe and. com programs. Mixed Language Programming: using Assembly with C/C ++

Unit-V
Microcontrollers: Introduction, basic functions, applications of 8-bit and 16-bit microcontrollers.
8-bit microcontrollers INTEL 8051: Internal Architecture, signals, memory organization and interfacing,Timing and control, port operations, interrupts and I/O addressing. Instruction Set and programming.
16-bit microcontrollers INTEL 8096: Architectural description, memory Organization and interfacing, I/O addressing, Interrupts, instruction set and programming.

Text Books:
1. Ray, A.K. & Burchandi, K.m., "Advanced Microprocessors and Peripherals: Architeacture, Programming and Interfacing" Tata Mc.Graw Hill.
2. Renu Sing & B.P.Singh, "Advanced Microprocessors and Microcontrollers" New Age International.
3. Krishna Kant,"Microprocessors and Microcontrollers" PHI Learning.
4. Brey, Barry B. "The INTEL Microprocessors" Pearson Education.

Reference Books:
5. Ayala, "The 8051 Micro Controller", Centage Learning.
6. Mazidi M.A., Maizidi J.G. Mckinlay R.D., "The 8051 Microcontroller and Embedded Systems" Pearson Education.
7. Rajkamal, "The concept and feature of microcontrollers 68HC11, 8051 and 8096", S.Chand Publisher, New Delhi
8. Peatman John, "Design with microcontroller", Mc.-Graw Hill Publishing.

NEE033/NEN-033: FLEXIBLE AC TRANSMISSION SYSTEMS

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UNIT I: Introduction

Reactive power control in electrical power transmission lines -Uncompensated transmission line – series compensation – Basic concepts of Static Var Compensator (SVC) – Thyristor Controlled Series capacitor (TCSC) – Unified power flow controller (UPFC).

UNIT II :Static Var Compensator (SVC) And Applications

Voltage control by SVC – Advantages of slope in dynamic characteristics – Influence of SVC on system voltage – Design of SVC voltage regulator –Modelling of SVC for power flow and fast transient stability – Applications: Enhancement of transient stability – Steady state power transfer Enhancement of power system damping.

UNIT III : Thyristor Controlled Series Capacitor (TCSC) And Applications

Operation of the TCSC – Different modes of operation – Modelling of TCSC – Variable reactance model – Modelling for Power Flow and stability studies. Applications: Improvement of the system stability limit – Enhancement of system damping.

UNIT IV :Voltage Source Converter Based Facts Controllers

Static Synchronous Compensator (STATCOM) – Principle of operation – V-I Characteristics. Applications: Steady state power transfer-enhancement of transient stability – prevention of voltage instability. SSSC-operation of SSSC and the control of power flow – modelling of SSSC in load flow and transient stability studies.

TEXT BOOKS:

1. R.Mohan Mathur, Rajiv K.Varma, "Thyristor – Based Facts Controllers for Electrical Transmission Systems", IEEE press and John Wiley & Sons, Inc, 2002.
2. Narain G. Hingorani, "Understanding FACTS -Concepts and Technology of Flexible AC Transmission Systems", Standard Publishers Distributors, Delhi- 110 006, 2011.
3. K.R.Padiyar," FACTS Controllers in Power Transmission and Distribution", New Age International(P) Limited, Publishers, New Delhi, 2008.

REFERENCES:

1. A.T.John, "Flexible A.C. Transmission Systems", Institution of Electrical and Electronic Engineers (IEEE), 1999.
2. V.K.Sood,HVDC and FACTS controllers – Applications of Static Converters in Power System, APRIL 2004 , Kluwer Academic Publishers, 2004.
3. Xiao – Ping Zang, Christian Rehtanz and Bikash Pal, "Flexible AC Transmission System: Modelling and Control" Springer, 2012.

NCS – 039: OBJECT ORIENTED SYSTEMS AND C++

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Unit-I
Object & classes, Links and Associations, Generalization and Inheritance, Aggregation, Abstract classes, Generalization, Multiple Inheritance, Meta data.

Unit-II
Events and States, Operations and Methods, Nested state diagrams, Concurrency, Relation of Object and Dynamic Models.

Unit-III
Functional Models, Data flow diagrams, Specifying Operations, Constraints, OMT Methodologies, examples and case studies to demonstrate methodology

Unit-IV
Principles of object oriented programming, Tokens, Expressions, classes, Functions, Constructors, Destructors,Functions overloading, Operator Overloading, I/O Operations.
Real life applications, Inheritance Extended Classes, Pointer. Virtual functions, Polymorphisms, Working with files, Class templates, Function templates,Exception handling, String manipulation.Translating object oriented design into implementations.

Unit-V:
Introduction to Unix/Linux operating systems. Concept of file system, handling ordinary files,concept
of shell, vi editor, Basic ile attributes, concept of process, Basic system administration.

Text Books:
1. Rambaugh James etal, "Object Oriented Design and Modeling",PHI-1997
2. Balagurusamy E," Object Oriented Programming with C++", TMH,2001 '
3. Sumitabha Das “Unix concepts & application” TMH

Reference Books:
1. Dillon and Lee, "Object Oriented Conceptual Modeling", New Delhi PHI-1993
2. Lipman, Stanley B, Jonsce Lajoie, *C++* Primer Reading", AWL, 1999
3. Stephen R. Shah, "Introduction to Object Oriented Analysis and Design", TMH
4. Berzin Joseph, "Data Abstraction: the object oriented approach using *C++"*, McGraw Hill
5. Budd, Timothy, "An Introduction to Object Oriented Programming", Pearson 2000

OPEN ELECTIVES- I

NEOE-071: ENTREPRENEURSHIP DEVELOPMENT

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UNIT -I

Entrepreneurship- definition. growth of small scale industries in developing countries and their positions vis-a-vis large industries; role of small scale industries in the national economy; characteristics and types of small scale industries; demand based and resources based ancillaries and sub-control types. Government policy for small scale industry; stages in starting a small scale industry.

UNIT -II

Project identification- assessment of viability, formulation, evaluation, financing, field-study and collection of information, preparation of project report, demand analysis, material balance and output methods, benefit cost analysis, discounted cash flow, internal rate of return and net present value methods.

UNIT -III

Accountancy- Preparation of balance sheets and assessment of economic viability, decision making, expected costs, planning and production control, quality control, marketing, industrial relations, sales and purchases, advertisement, wages and incentive, inventory control, preparation of financial reports, accounts and stores studies.

UNIT -IV

Project Planning and control:

The financial functions, cost of capital approach in project planning and control. Economic evaluation, risk analysis, capital expenditures, policies and practices in public enterprises. profit planning and programming, planning cash flow, capital expenditure and operations. control of financial flows, control and communication.

UNIT -V

Laws concerning entrepreneur viz, partnership laws, business ownership, sales and income taxes and workman compensation act. Role of various national and state agencies which render assistance to small scale industries.

Text / Reference Books:

1. Forbat, John, “Entrepreneurship” New Age International.
2. Havinal, Veerbhadrappa, “Management and Entrepreneurship” New Age International
3. Joseph, L. Massod, “Essential of Management", Prentice Hall of India.

NEOE-072: QUALITY MANAGEMENT

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UNIT-I

Quality Concepts:

Evolution of Quality Control, concept change, TQM Modern concept, Quality concept in design, Review of design, Evolution of proto type.

Control on Purchased Product

Procurement of various products, evaluation of supplies, capacity verification, Development of sources, procurement procedure.

Manufacturing Quality

Methods and techniques for manufacture, inspection and control of product, quality in sales and services, guarantee, analysis of claims.

UNIT-II

Quality Management

Organization structure and design, quality function, decentralization, designing and fitting, organization for different type products and company, economics of quality value and contribution, quality cost, optimizing quality cost, seduction program.

Human Factor in quality Attitude of top management, cooperation of groups, operators attitude, responsibility, causes of apparatus error and corrective methods.

UNIT-III

Control Charts

Theory of control charts, measurement range, construction and analysis of R charts, process capability study, use of control charts.

Attributes of Control Chart

Defects, construction and analysis of charts, improvement by control chart, variable sample size, construction and analysis of C charts.

UNIT -IV

Defects diagnosis and prevention defect study, identification and analysis of defects, correcting measure, factors affecting reliability, MTTF, calculation of reliability, building reliability in the product, evaluation of reliability, interpretation of test results, reliability control, maintainability, zero defects, quality circle.

UNIT –V

ISO-9000 and its concept of Quality Management

ISO 9000 series, Taguchi method, JIT in some details.

Text / Reference Books:

1. Lt. Gen. H. Lal, “Total Quality Management”, Eastern Limited, 1990.
2. Greg Bounds, “Beyond Total Quality Management”, McGraw Hill, 1994.
3. Menon, H.G, “TQM in New Product manufacturing”, McGraw Hill 1992.

NEOE-073: OPERATIONS RESEARACH

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UNIT-I

Introduction:

Difinition and scope of operations research (OR), OR model, solving the OR model, art of modelling, phases of OR study.

Linear Programming:

Two variable Linear Programaming model and Graphical method of solution, Simplex method, Dual Simplex method, special cases of Linear Programming, duality, senstivity analysis.

UNIT-II

Transportation Problems:

Types of transportation problems, mathemataical models , transportation algorithms,

Assignment:

Allocation and assignment problems and models, processing of job through machines.

UNIT-III

Network Teachniques:

Shortest path model, minimum spanning Tree Problem, Max-Flow problem and Min-cost problem.

Project Management:

Phases of project management, guidelines for network construction, CPM and PERT.

UNIT-IV

Theory of Games :

Rectanagular games, Minimax theorem, graphical solution of 2 x n or m x 2 games, game with mixed strategies, reduction to linear programming model.

Quality Systems:

Elements of Queuing model, generalized poisson queing model, single server models.

UNIT-V

Inventory Control:

Models of inventory, operation of inventory system, quantity discount.

Replacement:

Replacement models: Equipments that deteriorate with time, equipments that fail with time.

Text / Reference Books:

1. Wayne L. Winston,"Operations Research" Thomson Learning,2003.
2. Hamdy H. Taha, "Operations Research-An Introduction" Pearson Education,2003.
3. R. Panneer Seevam, "Operations Research" PHI Learning, 2008.
4. V.K.Khanna, "Total Quality Management" New Age International, 2008.

NEOE-074: INTRODUCTION TO BIOTECHNOLOGY

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UNIT-I

Introduction: Concept nature and scope of biotechnology.

Cell Structure and Function: Eukaryotic and prokaryotic cells, cell wall, membrane organization, cell organelles, Nucleus, Mitrochondria, endoplasmic reticulum, chloroplast, viruses and toxins into cells.

Cell Division: Mitosis and Meiosis.

UNIT-II

Biomolecules: A brief account of structure of carbohydrates, Lipids and Proteins.

Genes: Brief idea about Mendel's laws and chromosomes, nature of genetic materials, DN A and RNA, DNA replication.

UNIT-III

Gene Expression: Central dogma, genetic code, molecular mechanism on mutations, regulations of gene expression, house keeping genes, differentiation and development mutations and their molecular basic.

Genetic Engineering: Introduction, cloning (vectors and enzymes), DNA and genomic libraries, Transgenics, DNA fingerprinting, genomics.

UNIT-IV

Applications of Biotechnology: Bioprocess and fermentation technology, cell culture, Enzyme technology, biological fuel generation, sewage treatment, environmental biotechnology, biotechnology and medicine, biotechnology in agriculture, food and beverage technology, production of biological invention.

UNIT-V

Safety and Ethics: Safety, social, moral and ethic considerations, environmental ethics, bioethics and stem cell research, safety of new biotechnology foods, agro biodiversity and donor policies.

Text Books/ Reference Books:

1. Smith, "Biotechnology" Cambridge Press.
2. P.K. Gupta, "Elements of Biotechnology" Rastogi
3. H. D. Kumar, "Modern concepts of Biotechnology" Vikas publishing House.

NEN – 751: POWER SYSTEM LAB

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Note: - At least 10 experiments should be performed out of which 3 should be simulation based.

(A) Hardware Based:

1. To determine direct axis reactance (xd) and quadrature axis reactance (xq) of a salient pole alternator.
2. To determine negative and zero sequence reactances of an alternator.
3. To determine sub transient direct axis reactance (xd) and sub transient quadrature axis reactance (xq) of an alternator
4. To determine fault current for L-G, L-L, L-L-G and L-L-L faults at the terminals of an alternator at very low excitation
5. To study the IDMT over current relay and determine the time current characteristics
6. To study percentage differential relay
7. To study Impedance, MHO and Reactance type distance relays
8. To determine location of fault in a cable using cable fault locator
9. To study ferranty effect and voltage distribution in H.V. long transmission line using transmission line model.
10. To study operation of oil testing set.

(B) Simulation Based Experiments (using MATLAB or any other software)

11. To determine transmission line performance.
12. To obtain steady state, transient and sub-transient short circuit currents in an alternator
13. To obtain formation of Y-bus and perform load flow analysis
14. To perform symmetrical fault analysis in a power system
15. To perform unsymmetrical fault analysis in a power system

Text Books:-

1. Hasdi Sadat, “Power System Analysis” Tata Mc.Graw Hill.
2. T. K. Nagsarskar & M.S. Sukhija,’ Power System Analysis’ Oxford Universitry Press.

NEC 752: ANALOG AND DIGITAL COMMUNICATION LAB

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Note: The minimum 10 experiments are to be performed from the following:

1. To study amplitude modulation using a transistor and determine depth of modulation.
2. To study generation of DSB-SC signal using balanced modulator.
3. To study generation of SSB signal
4. To study envelope detector for demodulation of AM signal and observe diagonal peak clipping effect.
5. To study super heterodyne AM receiver and measurement of sensitivity, selectivity and fidelity.
6. To study frequency modulation using voltage controlled oscillator.
7. To detect FM signal using Phase Locked Loop.
8. To measure noise figure using a noise generator.
9. To study PAM, PWM and PPM.
10. To realize PCM signal using ADC and reconstruction using DAC and 4 bit/8bit system. Observe quantization noise in each case.
11. To study Delta Modulation and Adaptive Delta Modulation. 12. To study PSK-modulation system.
13. To study FSK-modulation system.
14. To study sampling through a Sample-Hold circuit and reconstruction of the sampled signal and observe the effect of sampling rate & the width of the sampling pulses.
15. To study functioning of colour television
16. Fabricate and test a PRBS generator
17. Realization of data in different forms, such as MRZ-L,NRZ - M&N,NRZ-S.
18. Manchester coding & decoding (Biphase L) of NRZ-L data.

NEE801/NEN-801: ELECTRICAL & ELECTRONICS ENGINEERING MATERIALS

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UNIT – I

1 Crystal Structure of Materials:

A. Bonds in solids, crystal structure, co-ordination number, atomic packing factor, Miller Indices, Bragg's law and x-ray diffraction, structural Imperfections, crystal growth

B. Energy bands in solids, classification of materials using energy band.

UNIT – II

2 Conductivity of Metals:

Electron theory of metals, factors affecting electrical resistance of materials, thermal conductivity of metals, heat developed in current carrying conductors, thermoelectric effect, superconductivity and super conducting materials, Properties and applications of electrical conducting and insulating materials, mechanical properties of metals

UNIT – III

3 Mechanism of Conduction in semiconductor materials:

Types of semiconductors, current carriers in semiconductors, Half effect, Drift and Diffusion currents, continuity equation, P-N junction diode, junction transistor, FET & IGFET, properties of semiconducting materials.

UNIT – IV

4 Magnetic Properties of Material:

Origin of permanent magnetic dipoles in matters, Classification Diamagnetism, Paramagnetism, Ferromagnetism, AntiferromagnetismandFerrimagnetism, magnetostriction, properties of magnetic materials, soft and hard magnetic materials, permanent magnetic materials.

Text Books :

1 A.J. Dekker,"Electrical Engineering Materials" Prentice Hall of India
2 R.K. Rajput," Electrical Engg. Materials," Laxmi Publications.
3 C.S. Indulkar & S.Triruvagdan "An Introduction to Electrical Engg. Materials, S.Chand & Co.

References :

4 Solymar, "Electrical Properties of Materials" Oxford University Press.
5. Ian P. Hones," Material Science for Electrical and Electronic Engineering," Oxford University Press.
6 G.P. Chhalotra & B.K. Bhat, "Electrical Engineering Materials" Khanna Publishers.
7 T. K. Basak, "Electrical Engineering Materials" New age International.

NEE-043/NEC-802: EMBEDDED SYSTEMS

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Unit-I
Introduction to embedded systems: Classification, Characteristics and requirements, Applications

Unit-II
Timing and clocks in Embedded systems, Task Modeling and management, Real time operating system issues.

Unit-III
Signals, frequency spectrum and sampling, digitization (ADC, DAC), Signal Conditioning and Processing.
Modeling and Characterization of Embedded Computation System.

Unit-IV
Embedded Control and Control Hierarchy, Communication strategies for embedded systems: Encoding and Flow control.

Unit-V
Fault-Tolerance, Formal Verification., Trends in Embedded Processor, OS, Development Language

References:
1. H.Kopetz, "Real-Time Systems", Kluwer
2. R.Gupta, "Co-synthesis of Hardware and Software for Embedded Systems",Kluwer
3. Shibu K.V., "Introduction to Embedded Systems", TMH
4. Marwedel, "Embedded System Design", Springer

NEE – 041/NEN-041: EHV AC & DC TRANSMISSION

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UNIT-I:Introduction :
Need of EHV transmission, standard transmission voltage, comparison of EHV ac & dc transmission systems and their applications & limitations, surface voltage gradients in conductor, distribution of voltage gradients on sub-conductors, mechanical considerations of transmission lines, modern trends in EHV AC and DC transmission

UNIT-II:EHV AC Transmission :
Corona loss formulas, corona current, audible noise – generation and characteristics corona pulses their generation and properties, radio interference (RI) effects, over voltage due to switching, ferroresonance, reduction of switching surges on EHV system, principle of half wave transmission.

UNIT-III:Extra High Voltage Testing:
Characteristics and generation of impulse voltage, generation of high Ac and Dc voltages, measurement of high voltage by spheregaps and potential dividers.
Consideration for Design of EHV Lines:
Design factors under steady state limits, EHV line insulation design based upon transient over voltages.Effects of pollution on performance of EHV lines.

UNIT-IV:EHV DC Transmission – I:
Types of dc links, converter station, choice of converter configuration and pulse number, effect of source inductance on operation of converters.
Principle of dc link control, converter controls characteristics, firing angle control, current and excitation angle control, power control, starting and stopping of dc link.

UNIT-V:EHV DC Transmission – II:
Converter faults, protection against over currents and over voltages, smoothing reactors, generation of harmonics, ac and dc filters,
Multi Terminal DC systems (MTDC): Types, control, protection and applications.

Text Books :
1.R. D. Begamudre, "Extra High Voltage AC Transmission Engineering" Wiley Eastern.
2.K. R. Padiyar, "HVDC Power Transmission Systems: Technology and System Reactions" New Age International.
3.J. Arrillaga," High Voltage Direct current Transmission" IFFE Power Engineering Series 6, Peter Peregrinus Ltd,London.
4.M. S. Naidu & V. Kamaraju, "High Voltage Engineering" Tata Mc Graw Hill.
Reference Books:
5.M. H. Rashid , " Power Electronics : Circuits, Devices and Applications" Prentice Hall of India.
6.S. Rao, "EHV AC and HVDC Transmission Engineering and Practice" Khanna Publisher.
7."EPRI, Transmission Line Reference Book, 345 KV and above" Electric Power Research Institute. Palo Alto,California, 1982.

NEE-042/NEN-042: POWER QUALITY

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Unit-I

Introduction to Power Quality: Terms and definitions of transients, Long Duration Voltage Variations: Under Voltage and Sustained Interruptions; Short Duration Voltage Variations: Interruption, Voltage Sag, Voltage Swell; Voltage Imbalance; Notching; D C offset; Waveform distortion; Voltage fluctuation; Power frequency variations.

Unit-II

Voltage Sag: Sources of voltage sag: Motor starting, Arc furnace, Fault clearing; Estimating voltage sag performance and principle of its protection; Solutions at end user level: Isolation Transformer, Voltage Regulator, Static UPS, Rotary UPS, Active Series Compensator.

Unit-III

Electrical Transients: Sources of Transient Over voltages- Atmospheric transients; Switching transients: Motor starting transients, PF correction capacitor switching transients, UPS switching transients; Neutral voltage swing; Devices for over voltage protection.

Unit-IV

Harmonics: Causes of harmonics; Current and Voltage harmonics; Measurement of Harmonics; Effects of harmonics on – Transformers, AC motors, Capacitor banks, Cables, and Protection devices, Energy metering and Communication lines; Harmonic mitigation techniques.

Unit-V

Measurement and Mitigation of Power Quality Problems: Power quality measurement devices: Harmonic Analyzer, Transient Disturbance Analyzer, Wiring and Grounding tester, Flicker meter, Oscilloscope, Multi-meter; Introduction to Custom Power Devices - Network reconfiguration devices; Load compensation and Voltage regulation using DSTATCOM; Protecting sensitive loads using DVR; Unified Power Quality Conditioner (UPQC).

Text Books:

1. Roger C Dugan, McGrahan, Santoso & Beaty, "Electrical Power System Quality" McGraw Hill
2. Arinthom Ghosh & Gerard Ledwich, "Power Quality Enhancement Using Custom Power Devices" Kluwer Academic Publishers
3. C. Sankaran, " Power Quality" CRC Press.

NEN -043 : IMAGE PROCESSING

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UNIT-I

Image:

Image formation, image geometry perspective and other transformation, sterio imaging elements of visual perception Digital Image-sampling and quantization serial & parallel Image processing

UNIT-II

Signal Processing - Fourier, Walsh-Hadmard discrete cosine and Hotelling transforms and their properties, filters, correlators and convolvers Image enhancement-Contrast modification, Histogram specification, smoothing, sharpening, frequency domain enhancement, pseudo-colour enhancement

UNIT-III

Image Restoration-Constrained and unconstrained restoration Wiener filter , motion blur remover,geometric and radiometric correction Image data compression-Huffman and other codes transform compression, predictive compression two tone Image compression, block coding, run length coding, and contour coding.

UNIT-IV

Segmentation Techniques-thresholding approaches, region growing, relaxation, line and edge detection approaches, edge linking, supervised and unsupervised classification techniques, remotely sensed image analysis and applications

UNIT-V

Shape Analysis – Gestalt principles, shape number, moment Fourier and other shape descriptors, skelton detection, Hough transform, topological and texture analysis, shape matching.
Practical Applications – Finger print classification, signature verification, text recognition, map understanding, bio-logical cell classificaton.

Text Books:

1.Ganzalez and Wood, “Digital Image Processing”, Addison Wesley, 1993.
2.Anil K.Jain, “Fundamental of Image Processing”, Prentice Hall of India

References:

1.Rosenfeld and Kak, “Digital Picture Processing” vol.I & vol.II, Academic,1982
2.Ballard and Brown, “Computer Vision”, Prentice Hall, 1982
3.Wayne Niblack, “An Introduction to Digital Image Processing”, Prentice Hall, 1986
4.Milan Sonka, Vaclav Hlavac, Roger Boyle, “Image Processing, Analysis and Machine Vision”,Vikas Publications.

NEN-044 : SATELLITE COMMUNICATION

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3 1 0

UNIT-I

Elements of Satellite Communication Orbital mechanics, look angle and orbit determination, launches & launch vehicle, orbital effects, Geostationary Orbit.

UNIT-II

Satellite subsystems, attitude and orbit control systems, TTC&M, communication subsystem, satellite antenna satellite link design: basic transmission theory, system noise temperature and G/T ratio, downlink design, uplink design, satellite systems using small earth station, design for specified C/N.

UNIT-III

Modulation and multiplexing techniques for satellite links: FM, pre-emphasis and de-emphasis, S/N ratios for FM video transmission, digital transmission, digital modulation and demodulation, TDM. Multiple access: FDMA, TDMA, DAMA and CDMA.

UNIT-IV

Error control for digital satellite links: error detection and correction, channel capacity, error control coding, convolutional codes, linear and cyclic block codes.Propagation effects and their impact on satellite-earth links: attenuation and depolarization, atmospheric absorption, rain, cloud and ice effects etc.

UNIT-V

Introduction of various satellite systems: VSAT, low earth orbit and non-geostationary, direct broadcast satellite television and radio, satellite navigation and the global positioning systems.

Text Books:

1. Satellite Communications / Pratt, Bostian, Allnutt / John Wiley & Sons.
2. Satellite Communications / Dennis Roddy / McGraw-Hill
3. Digital Satellite Communications/ Tri T. Ha./ McGraw-Hill.

OPEN ELECTIVES- II
NEOE-081: NON-CONVENTIONAL ENERGY RESOURCES

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3 1 0

UNIT-I:
Introduction: Various non-conventional energy resources- Introduction, availability, classification, relative merits and demerits.
Solar Cells: Theory of solar cells. solar cell materials, solar cell array, solar cell power plant, limitations.

UNIT-II :
Solar Thermal Energy: Solar radiation, flat plate collectors and their materials, applications and performance, focussing of collectors and their materials, applications and performance; solar thermal power plants, thermal energy storage for solar heating and cooling, limitations.
UNIT-III :
Geothermal Energy: Resources of geothermal energy, thermodynamics of geo-thermal energy conversion-electrical conversion, non-electrical conversion, environmental considerations.
Magneto-hydrodynamics (MHD): Principle of working of MHD Power plant, performance and limitations.
Fuel Cells: Principle of working of various types of fuel cells and their working, performance and limitations.
UNIT-IV :
Thermo-electrical and thermionic Conversions:
Principle of working, performance and limitations.
Wind Energy: Wind power and its sources, site selection, criterion, momentum theory, classification of rotors, concentrations and augments, wind characteristics. performance and limitations of energy conversion systems.
UNIT-V :
Bio-mass: Availability of bio-mass and its conversion theory.
Ocean Thermal Energy Conversion (OTEC): Availability, theory and working principle, performance and limitations.
Wave and Tidal Wave: Principle of working, performance and limitations.
Waste Recycling Plants.

Text/References Books:

1. Raja etal, "Introduction to Non-Conventional Energy Resources" Scitech Publications.
2. John Twideu and Tony Weir, "Renewal Energy Resources" BSP Publications, 2006.
3. M.V.R. Koteswara Rao, " Energy Resources: Conventional & Non-Conventional " BSP Publications,2006.
4. D.S. Chauhan,"Non-conventional Energy Resources" New Age International.
5. C.S. Solanki, "Renewal Energy Technologies: A Practical Guide for Beginners" PHI Learning.
6. Peter Auer, "Advances in Energy System and Technology". Vol. 1 & II Edited by Academic Press.
7. Godfrey Boyle," Renewable Energy Power For A Sustainable Future", Oxford University Press.

NEOE-082: NON-LINEAR DYNAMIC SYSTEMS

L T P
3 1 0

UNIT-I

Dynamic systems:

Concept of dynamic systems, importance of non-linearity, nonlinear dynamics of flows (in 1, 2, and 3 dimensions) and Maps (1 and 2 dimensions) in phase space, Equilibrium, Periodicity. Picard's theorem, Peano's theorem, boundedness of solutions, omega limit points of bounded trajectories.

UNIT-II

STABILITY-I:

Stability via Lyapunov's indirect method, converse Lyapunov functions, sublevel sets of Lyapunow functions, Lasalle's invariance principle.

UNIT-III

Stability-II

Lyapunov's direct method, converse Lyapunov's theorems, Brokett's theorem, applications to control system, stable manifold theorem, centre manifold theorem, normal form theory and applications to nonlinear systems.

UNIT-IV

Bifurcation:

Elementary Bifurcation theory, catastrophe, strange attractor, fractals, fractal geometry and fractal dimension.

UNIT-V

Chaos:

Deterministic Chaos, routes to chaos (period doubling, quasiperiodicity, intermittency, universality, renormalization); Measurement of Chaos (Poincare section, Lyapunov index, entropy);.control of chaos.

Reference Books:

1. D.K. Arrowsmith and C.M. Place, "An Introduction to Dynamical Systems" Cambridge University press, London, 1990.
2. K.T. Alligood, T.D. Sauer, and J.A Yorke, "CHAOS: An Introduction to Dynamical System" Springer Verlag, 1997.
3. H.K. Khalis, "Nonlinear Systems" Prentice Hall, 1996.
4. R. R. Mohler, "Non linear systems, Vol-I: Dynamics and Control" Prentice Hall, 1991.
5. J.M. T. Thomson and H.B. Stewart, "Nonlinear Dynamics and Chaos" John Wiley & Sons, 1986.
6. Stanislaw H. Zak, "Systems and control" Oxford University Press, 2003.

NEOE-083 : DATABASE MANAGEMENT SYSTEM AND DATA MINING AND WAREHOUSING

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3 1 0

Unit-I:

Introduction:

An overview of database management system, database system v/s file system, Database system concepts and architecture, data models schema and instances, data independence and data base language and interfaces, data definitions language, DML, overall database structure.

Data modeling using the Entity Relationship Model:

ER model concepts, notation for ER diagram, mapping constraints, keys, concepts of super key, candidate key, primary key, generalization, aggregation, reduction of an ER diagrams to tables extended ER model, relationships of higher degree.

Unit-II:

Relational data Model and Language:

Relational data model concepts, integrity constraints: entity integrity, referential integrity, keys constraints, domain constraints, relational algebra, relational calculus, tuple and domain calculus.

Introduction to SQL: Characteristics of SQL-Advantage of SQL data types and literals, types of SQL commands, SQL operators and their procedure tables, views and indexes, queries and sub queries, aggregate functions, insert, update and delete operations. Joins, Unions, Intersection, minus, cursors in SQL.

Unit-III:

Data Base Design & Normalization:

Functional dependencies, normal forms, first, second and third normal forms,BCNF,inclusion dependences, loss less join decompositions, normalization using FD,MVD,and JDs, alternative approaches to database design.

Unit-IV:

Foundation. Introduction to DATA Warehousing. Client / Server Computing model & Data Warehousing. Parallel processors & System. Distributed DBMS implementations.
Client /Server RDBMS Solutions.

Unit-V:

DATA Warehousing. Data Warehousing Components. Building a Data Warehouse. Mapping the Data Warehouse to a Multiprocessor Architecture. DBMS Schemas for Decision Support. Data Extraction, cleanup & Transformation Tools. Metadata.

Data Mining: Introduction to data mining

Text Books:

1. Korth, Silbertz, Sudarshan, .Database Concepts., Mc Graw Hill
2. Date C.J., .An Introduction to Database System., Addition Wesley
3. Alex Berson & Stephen J.Smith,.Data Warehousing,Data Mining & OLAP.,Tata Mc.Graw Hill.
4. Mallach, .Data Warehousing System., Mc. Graw Hill

Reference Books:

1. Elmasri, Navathe, .Fundamentals of Database Systems.,Addition Wesley
2. Bipin C.Desai, .An Introduction to Database Systems, .Galgotia Publication
3. Majumdar & Bhattacharya, .Database Management System., Tata Mc Graw Hill
4. Ramakrishnan, Gehrke, .Database Management System., Mc Graw Hill.

NEOE-084: AUTOMATION AND ROBOTICS

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Unit: 1

Introduction: Definition, Classification of Robots, geometric classification and control classification.

Unit: 2

Robot Elements: Drive system, control system, sensors, end effectors, gripper actuators and gripper design.

Unit: 3

Robot Coordinate Systems and Manipulator Kinematics: Robot co-ordinate system representation, transformation, homogenous transform and its inverse, relating the robot to its world.

Manipulators Kinematics, parameters of links and joints, kinematic chains, dynamics of kinematic chains, trajectory planning and control, advanced techniques of kinematics and dynamics of mechanical systems, parallel actuated and closed loop manipulators.

Unit: 4

Robot Control: Fundamental principles, classification, position, path velocity and force control systems, computed torque control, adaptive control, Seroo system for robot control, and introduction to robot vision.

Unit: 5

Robot Programming: Level of robot programming, language based programming, task level programming, robot programming synthesis, robot programming for welding, machine tools, material handing, assembly operations, collision free motion planning.

Applications: Application of robot in welding, machine tools, material handling, assembly operations parts sorting and parts inspection.

Text/Reference Books:

1. Coifet Chirroza, "An Introduction to Robot Technology" Kogan Page.
2. Y. Koren "Robotics for Engineers" Mcgraw Hill.
3. K. S. Fu, R.C. Gonzalez Y& CSG Lee, "Robotics" McGraw Hill.
4. J.J. Craig, "Robotics" Addison-Wesley.
5. Grover, Mitchell Weiss, Nagel Octrey, "Industrial Robots" Mcgraw Hill.
6. Asfahl, "Robots & Manufacturing Automation" Wily Eastern.