SPECIAL TOPICS IN POWER SYSTEMS
MTEE-215

Unit-1
Transmission Open Access, Transmission Pricing, Impact of Congestion and Congestion Management, ATC and Factor affecting ATC, Determination of ATC.

Unit-2
Power System Computation and Computer Application: OPF and its Formulation, Solution Techniques NLP Methods, LPOPf Interior Point Method, AI Techniques, GA and Particle Swarm Optimization (PSO).

Unit-3
SCADA & Distribution Automation: Energy management systems, Power system communication, PICC Digital Communication, Microwave communication, Utility communication architecture, Java and Web based technologies. Software Agents.

Unit-4

Text/Reference:


Note: The theory question paper will have 5 sections containing a total of 9 questions. Section-1 will have one compulsory question from whole syllabus. The remaining 8 questions will be divided into 4 sections (2 questions per unit per section) and the student will have to attempt 5 questions i.e. exactly one question from each of the sections.
KURUKSHETRA UNIVERSITY, KURUKSHETRA
M.TECH. (ELECTRICAL ENGINEERING)

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INTELLIGENT CONTROL
MTEE -205

**Unit-1**

**ANN Models & Architecture:**
Biological foundations, ANN models, Types of activation function, introduction to network architecture, multilayer feed forward network (MLFFN), Kohonen self organizing map, radial basis, Function network (RBFN), recurring neural network.

**Unit-2**

**Learning Processes:**
Supervised and unsupervised learning, error-correction learning, Hebbian learning, Boltzman learning, single layer and multilayer perception model, least mean square algorithm, back propagation algorithm, Application in forecasting and pattern recognition and other power engineering problems.

**Unit-3**

**Fuzzy Sets and Theory:**
Fuzzy sets, fuzzy set operations, properties, membership functions, fuzzy to crisp conversion, measures of fuzziness, fuzzification and defuzzification methods, application in engineering problems.

**Unit-4**

**Fuzzy Control System:**
Introduction, simple fuzzy logic controllers with examples, special forms of fuzzy logic models, classical fuzzy control problems.

**Text/References:**

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POWER SYSTEM PLANNING
MTEE-207

Unit-1
Introduction: Power System planning, objective, stages in planning & design, Key indices of power system reliability and their calculations, Linkage between reliability and capacity planning.

Unit-2
Generating System capability Planning: Probabilistic models of generating units, growth rate, Rate of generation capacity, Outage performance and system evaluation of loss of load and loss of energy indices, Power supply availability assessment

Unit-3
Interconnected Systems: Multi area reliability analysis, Power pool operation and power exchange energy contracts, quantification of economic and reliability benefits of pool operation
Demand/ Energy forecasting: Electricity consumption pattern, Peak demand and energy forecasting by trend and economic projection methods,

Unit-4
Power System expansion planning: Formulation of least cost optimization problem involving capital, operation and maintenance costs of candidate units of different types.
Investment Planning Models: Traditional generation expansion planning models, integrated resource planning models, production cost simulation models.

Text/Reference:
4. Billinton R., Power System Reliability Calculation, MIT Press, USA

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LOAD AND ENERGY MANAGEMENT
MTEE-213

Unit-1
Load Forecasting: Classification and characterization of loads, Approaches to load forecasting, Forecasting methodology, Energy forecasting, Peak demand forecasting, Non-weather sensitive forecast and Weather sensitive forecast, Total forecast, Annual and monthly peak demand forecasts. Applications of state estimation to load forecasting.

Unit-2

Unit-3
Energy Demand Forecasting: Static and dynamic analysis of energy demand, elements of energy demand forecasting, methodologies and models for energy demand forecasting, techno-economic approach in energy demand forecasting.

Unit-4
Trends and Case Studies: Energy management strategy, symbiotic relation between information, energy models and decision making, case studies like industrial energy forecasting, transportation energy forecasting, residential, commercial and agricultural energy forecasting

Text/Reference:

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RELIABILITY ENGINEERING
MTEE-211

Unit-1
Review of basic concepts in Reliability Engg., Reliability function, different reliability models, etc., Reliability evaluation techniques for complex systems; Tie set and cutest approaches, different reliability measures, Reliability allocation/apportionment, reliability improvement, redundancy optimization techniques.

Unit-2
Fault tree analysis: fault tree construction, simplification and evaluation, importance measures, modularization, applications, advantages and disadvantages of fault tree techniques.

Unit-3
Maintainability Analysis: measures of system performance, types of maintenance, reliability centered maintenance, reliability and availability, evaluation of engineering systems using Markov models.

Unit-4

References:
2. KB Mishra, “Reliability Analysis & Prediction”.
5. K.K. Aggarwal, “Reliability Engineering”.
6. Roy & Billington-“Reliability Engineering”.

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ADVANCED MICROPROCESSORS
MTEE -209

UNIT-1
Architecture of 8086 microprocessor, Memory Addressing, Bus Timings for MN/MX mode, interrupt structure. Memory Interfacing and Address decoding techniques for 8086 microprocessor

UNIT-2

UNIT-3
Introduction to microcontrollers, Architecture of 8051 microcontroller, basic Instruction set, programming, serial data communication, interfacing with D/A and A/D converters.

UNIT-4

References:
1. Advanced Microprocessors, PHI, D.V.Hall
2. The Intel Processors, Pearson Education, B. Brey

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COMPUTATIONAL METHODS FOR ELECTROMAGNETICS
MTEE-219

Unit-1
**Fundamental Concepts:**
Review of Maxwell’s equations & boundary, conditions, integral equations versus differential equations, radiation and edge, conditions, modal representation of fields in bounded and unbounded media.

Unit-2
**Green’s Functions:**
Green’s function technique for the solution of partial differential equations, classification of Green’s functions, various methods for the determination of Green’s functions including Fourier transform technique and Ohm-Rayleigh technique, dyadic Green’s functions, determination of Green’s functions for free space, transmission lines, waveguides, and microstrips.

Unit-3
**Integral Equations:**
Formulation of typical problems in terms of integral equations: wire antennas, scattering, apertures in conducting screens and waveguides, discontinuities in waveguides and microstriplines; Solution of Integral equations: General Method of Moments (MoM) for the solution of integro-differential equations, choice of expansion and weighting functions, application of MoM to typical electromagnetic problems.

Unit-4
**Finite Element Method:**
Typical finite elements, Solution of two-dimensional Laplace and Poisson’s equations, solution of scalar Helmholtz equation.

**Finite-difference Time-domain Method:**
Finite differences, finite difference representation of Maxwell’s equations and wave equation, numerical dispersion, Yee’s finite difference algorithm, stability conditions, programming aspects, absorbing boundary conditions.

**Suggested Books:**

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