SEMESTER-VII

CONTROL SYSTEM- II (EE 7119)

Sampling Techniques and Reconstruction.
Transform analysis of Sample data systems.
Transform design of digital control.
 State space analysis of sampled data systems.
Design of digital controls.
Self timing controls.
Microprocessor based position control system, furnace control
& Stepper motor control.

COMPUTER ADDED POWER SYSTEM (EE 7120)

Representation of power system components: Mathematical Modeling, Power System
formulation, GS, NR FDLF methods.
Optimal power system operation :
Unit commitment, Reliability, Economic dispatch, Emission dispatch, optimal load flow,
Optimal Hydrothermal scheduling.
Power System Security.
State estimation
Load forecasting
SCADA: Automatic Generation Control

MODELLING & SIMULATION (EE 7121)

Fundamentals of modeling , Classification of simulation models, the simulation process
System investigation, model formation, validation & translation, time-flow mechanism,
design of computer simulation experiments, simulation of complex discrete event system
with application in industrial & service organizations,
    Tactical planning & management aspects, Random variable generation & Analysis.
Case studies: Automatic Generation control, EDC etc**.**

List of Elective for Seventh Semester:

ELECTIVES I & II

1.   DIGITAL SIGNAL PROCESSING (EE 7122)
2.   ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEM (EE 7123)
3.   NEURAL NETWORKS (EE 7124)
4.   MACHINES AND DRIVES DYNAMICS (EE 7125)
5.   CAD OF ELECTRICAL MACHINE (EE 7126)
6.   OBJECT ORIENTED PROGRAMMING LANGUAGE (EE 7127)

7. NON-CONVENTIONAL ENERGY (EE 7128)
8. MANAGEMENT INFORMATION SYSTEM (EE 7129)
9. PROCESS CONTROL & INSTRUMENTATION (EE 7130)
10. MATLAB APPLICATION (EE 7131)
11. VIRTUAL INSTRUMENTATION (EE 7132)
12. MANEGERIAL ACCOUNTING AND FINANCIAL MANAGEMENTS (EE 7133)
13. COMPUTER NETWORKS (IT 6103)
14. DATA STRUCTURE (CS 3101)

1. DIGITAL SIGNAL PROCESSING (EE 7122)

Review of Signals and Systems, Sampling and data reconstruction processes. Z Transforms. Discrete linear systems. Frequency domain design of digital filters. Quantization effects in digital filters. Discrete Fourier transformation and FFT algorithms. High speed convolution and its application to digital filtering.

2. ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEM (EE 7123)

1. INTRODUCTION TO A.I.
   Overview, concept of knowledge, A.I. Programming and languages (LISP and Prolog)

2. KNOWLEDGE REPRESENTATION :
   Symbolic logic, dealing with in-consistencies and uncertainties, structured knowledge, object oriented representation.

3. KNOWLEDGE ORGANISATION AND MANIPULATION:
   Searching and Matching Techniques, Knowledge organization and management.

4. PERCEPTION, COMMUNICATION AND EXPERT SYSTEM(VERY BASIC)
   Natural language processing, pattern recognition, visual image understanding, Expert system architecture.

5. KNOWLEDGE ACQUISITION (ONLY BASIC)
   General concept in knowledge acquisition, learning by induction, Examples of inductive learners, Analogical and explanation basic learning.

3. NEURAL NETWORKS(EE 7124)

Introduction to Biological Neural networks ; Basic anatomy and physiology of a nerve cell ; mathematical model of a biological neuron ; networks of neurons ; a simple model of a neuron and its applications to a classification problem ; linear separability and linear dichotomies ; nonlinearly separable problems ; learning with layered networks ; back-propagation ; recurrent neural networks ; the Hopfield networks ; application to

optimization tasks ; unsupervised learning – both co -operative and competitive ; Oja and Sanger's rules ; Principal component analysis ; Kohonen's self organizing feature map ; applications of unsupervised learning ; Reinforcement learning ; Support Vector Machines ; Current Trends and Future Directions.

4. MACHINES AND DRIVES DYNAMICS (EE 7125)

General Volt – ampere & torque equations under stationary & rotating reference frames. Instantaneous symmetrical components & generalized operational equivalent circuits. Space vector concepts.   Modeling of D.C. machines; analysis under motoring & generating. Simulation for transient & dynamic conditions. Modeling of synchronous machines; d-q transformations fixed to field structure – steady state & dynamic equations.   Phasor   diagram for cylindrical rotor & salient pole machines.- electromagnetic & reluctance torque. Response under short circuit conditions. Modeling of induction machines.   Equations under stationary & rotating reference frames, derivation of equivalent circuits, correlation of inductances, run up transients, dynamics under load change, speed reversal & braking, unbalanced & asymmetrical operation. Modeling & analysis of permanent magnet, switched reluctance & stepper motors, development of computer software using latest simulation tools to predict the behavior of different machines.

5. CAD OF ELECTRICAL MACHINE (EE 7126)

Basic design methodology and engineering consideration. Properties of electric magnetic and insulating materials. Choice of materials, frames etc. computerization of design procedures, optimization techniques and their application to design problems. Design of large and FHP motors. Data based and knowledge based expert systems. Development of PC based software, exercise on design using standard software.

6. OBJECT ORIENTED PROGRAMMING LANGUAGE (EE 7127)

Introduction to c++ : Object Oriented Technology , Advantages of OPP , Usage of OPP , Input – output in c ++,Tokens, Keywords, Identifiers, Data Types C++ , Derives data type , The void data type , Type Modifiers , Typecasting , Constant ,Operator , Precedence of operators , Referencing and Dereferencing , comma operator , Memory Management operator , Strings .
Control Structures : Decision making statements like if-else, Nested if-else , jump go-to , break continue , switch case , Nested switch case ,Loop statement like for loop, while loop, do-while loop.
Functions : main ( ) function ,parts of function , passing arguments , L value and R values, return by reference, Default arguments, Inline function , Function overloading , Precaution with function overloading ,Library function .
Classes and objects : Structure in C ++ ,Class ,Object ,public private , protected keywords, Member functions ,Data Hiding Static member variables and functions , Static Objects , Array of objects , Objects as function Arguments , Friend functions ,The const member function, Recursive member function , Local classes, Empty , static and

const classes ,Member function and Non- member functions , The main( ) as a member function, Local vs Global object.

Constructors destructors : Application with constructors ,constructors with arguments , Overloading constructors ,copy constructor , The const objects, calling constructors and destructors ,Anonymous objects , private constructor & Destructor ,Dynamic Initialization Using constructor ,The main( ) as a constructor and Destructor, Constructor & Destructor with static Members.

Operator Overloading &Type conversion : The keyword operator , Operator return type ,Overloading unary & binary operation , overloading with friend function , Type conversion .

Inheritance : Single, Multiple , Multilevel , Hierarchical ,Hybrid ,and Multi-path inheritance , Virtual Base class, Constructor Destructor and Inheritance , Abstract class , Pointer and Inheritance ,Overloading Member function , Pros and cons of Inheritance.

Pointer and Array : Void pointers , Wild pointer ,Pointer to class , Pointer to object , The this pointer , Pointer to Derived classes and Base Classes, Pointer to members , Accessing of object & Void Pointer , Arrays, Arrays of classes.

C ++ & Memory : The new & Delete operator, Help consumption , Overloading new & delete operator , Execution sequence of constructor & destructor ,Dynamic object , Specifying address of the object .

Binding ,Polymorphism & virtual function : Binding in C++ , Pointer to Derived class objects , virtual function , Pure virtual function , Abstract class , virtual function in derived class , object slicing , constructor and virtual function ,virtual destructor , Destructor and virtual function .

Files: File stream classes, checking for errors, File opening modes, File pointer, Random access operation , etc.

Templates: Need of templates , Normal function Templates , class templates , Overloading of templates function , Member function templates.

Exception Handling : The keyword try, throw and catch , Re-throwing exception , Multiple catch statement , Catching multiple exceptions, Exception in constructors & Destructors, Exception & operator overloading, and Exception & Inheritance.

7. NON-CONVENTIONAL ENERGY(EE7128)

1)   Indian and global energy sources energy demand energy planning and exploited various source of energy.
2)   Bio-gas: aerobic and anaerobic bio-conversion process, raw materials, Bio-gas properties plant technology.
3)   Wind Energy: Fundamentals, aerofesil design, wind power system, economic & selection of wing mill, recent development.
4)   Solar energy: solar radiation, solar thermal power solar energy storage, recent development in solar power plants.
5)   Fuel Cell: reversible and ideal fuel cell, other types of fuel cell efficiency of full cell
6)   Geo-Thermal energy: Hot springs, steam ejections site selection, power plants, advanced concepts.

7)   Ocean energy: power plant based on ocean energy availability, theory and working principle of ocean thermal energy conversion

8)   Magneto-Hydro dynamics (MHD): Principle of working performance and limitations

9)   Wave and tidal wave: Principle of working performance and limitations

10)   Thermo-electrical and thermo-ionic conversion: Power generation properties of thermoelectric materials, fusion, plasma generators

8. MANAGEMENT INFORMATION SYSTEM (EE 7129)

Introduction to MIS: concept, Definition, etc

Role and Importance of Management: Approaches to Management, Functions of the Manager, Managers & the Environment as a control system, etc

Process of Management: Management Effectiveness, Planning, Organising, Staffing, Coordinating& Directing, Controlling, etc

Organisation Structure & Theory: Basic Model, Modifications, Organisational Behaviour, Organisation as a system, MIS: Organisation

Strategic Management of Business: Corporate Planning, Strategic planning, development of Business Strategies, Type of Strategies, Short-Range Planning, MIS Business planning

Decision Making: Concepts, Decision Methods, Tools and Procedures, Behavioural concepts, Organisational Decision Making, MIS and Decision Making concepts

Information: Concepts, Classification, Methods of Collection, Value, Organisation and Information, MIS and the Information Concepts

Systems: Concepts, Control , Types, Handling Complexity, Implementation Problems, MIS and system Concept

System Analysis & Design :Introduction, Need, System Development Model, Structured System Analysis & design, Computer System Design, MIS and System Analysis

Development of MIS: Long Range Plans, Class of Information, Information Requirement, Implementation of MIS Quality in the MIS Organisation for development of the MIS, MIS: the Factors of Success and Failures

Choice of Information Technology: Nature of IT Decisions, Strategic Decision, Configuration Decision, Evaluation, IT Implementation Plan , Choice of IT and the MIS

Application of MIS: Application in Manufacturing Sector, Applications in Service Sector, Decision Support Systems, Enterprise Management Systems

Technology of Information System: Data Processing, Transaction processing, Application Processing, Information System Processing, TQM of Information Systems, Human Factor & User Interface

Business process Re-Engineering: Business Process Model, Value stream Model, Relevance of IT, MIS and BPR

Electronics Business Technology: Models, Electronic payment Systems, Security in E-Business, MIS and E-Business

Web: A Tool for Business Management : Internet & Web and Process of Management, Strategic Management under Web, Web enabled Business Management, Application System Architecture in Web, MIS in Web Environment

9. PROCESS CONTROL & INSTRUMENTATION (EE 7130)

Transducers: Temp. transducers, Strain gauges, Pressure and Flow transducers, digital transducers. Instrumentation for Computer Control and Data Transmission: Signal transmission, Common mode noise, Noise suppression Signal termination, Multiplexers, Microprocessor Based Data Acquisition Systems: Instrumentation amplifiers, sample and hold circuits, Digital to Analog and Analog to Digital Converters, Data Acquisition Systems. Process Control Fundamentals: Proportional band, Proportional plus derivative, proportional plus derivative plus integral control, Cascade control, feed forward control, Direct digital control, Ratio control. Development of Digital Control Algorithms: First order lag filter, PID Algorithms, Velocity Algorithms, Dynamic compensation algorithm, Dead time compensation algorithm, Kalmn set-point controller, Z-transform based control algorithms. Programmable Logic Controllers (PLC): Relay logic Vs. Programmable Controllers, Architecture and important features of programmable controllers, Ladder programming, PC programming, Typical applications, Automatic Test Equivalent (ATE): IEEE 488 Bus-Specifications, Data transfers, Microcontrollers for control applications: 8048/Intel8051; Intel8096.

10. MATLAB APPLICATION (EE 7131)

11. VIRTUAL INSTRUMENTATION (EE 7132)
   (Detail Sylabie for S.N. 10 & 11 will be provided later on)
12. MANEGERIAL ACCOUNTING AND FINANCIAL MANAGEMENTS (EE 7133)

Accounting principles underlying preparation of financial statements, managerial uses of financial data .ratio analysis and interpretation of financial statement. Cost concepts . cost volume- profit relationship and profit planning. Break even analysis. Incremental analysis and managerial decision. Budgetary control system and preparation of various types of budgets. Time value of money. Cost of capital and capital budgeting. Determinants of working capital and its measurement. Cash management. Receivables management. Introduction to international finance; risk management in international operation

13. COMPUTER NETWORKS (IT 6103)

Overview of Data Communications and Networking
 Introduction, Network Models

Physical Layer
Signals, Digital Transmission, Analog Transmission, Multiplexing, Transmission Media, Circuit Switching and Telephone Network.

Data Link Layer
Error Detection and Correction, Data Link Control and Protocol, Point to Point Access PPP, Multiple Access, Local Area Networks : Ethernet, Wireless Lans, Connecting Lans,

Backbone Networks, Virtual Lans, Cellular Telephone and Satellite Networks, Virtual Circuit Switching.

Network Layer
Host-to-Host Delivery :Internetworking, Addressing and Routing, Network Layer Protocols : ARP, IPv4, ICMP, IPv6, and ICMPv6, Unicast and Multicast Routing : Routing Protocols.

Transport Layer
Process-to-Process Delivery : UDP and TCP, Congestion Control and Quality of Service.

Application Layer
Client-Server Model : Socket Interface, Domain Name System (DNS), Electronic Mail (SMTP), and File Transfer (FTP), HTTP and WWW, Multimedia.

Security
Cryptography, Message Security, User Authentication, and Key Management, Security Protocols in the Internet.

14. DATA STRUCTURE (CS 3101)

Overview of C Language
Time and Space analysis of Algorithms- Order Notations.

Linear data Structures – Sequential representations – Arrays and Lists, Stacks, Queues and De-queues, strings, Application.

Linear Data Structures, Linear linked lists, Circularly linked lists. Doubly linked lists, application.

Recursion – Design of recursive algorithms. Tail Recursion, when not to use recursion, Removal of recursion.

Non-linear Data Structure: Trees – Binary Trees, Traversals and Threads, Binary Search Trees, Insertion and Deletion algorithms, Height-balanced and weight-balanced trees, B-trees, B+ -trees, Application of trees; Graphs-Representations, Breadth-first and Depth – first Search.

Hashing – Hashing Functions, collision Resolution Techniques.

Sorting and Searching Algorithms- Bubble sort, Selection Sort , Insertion Sort, Quick Sort, Merge Sort, Heap sort and Radix Sort.

File Structures – Sequential and Direct Access. Relative Files, Indexed Files –B + TREE as index, Multi-indexed Files, Inverted Files, Hashed Files.