

**6<sup>TH</sup> SEMESTER**  
**DISCIPLINE SPECIFIC ELECTIVES (DSEs)**

**OPTION - I**

**EEM616DA: ELECTRONIC EQUIPMENT MAINTENANCE & DESIGN(EEM): PROCESS CONTROL**  
**(CREDITS: THEORY-04, PRACTICALS-02)**

**Unit I**

Need of computer in a control system, Functional block diagram of a computer control system, Data loggers, Supervisory computer control, Direct digital control, Digital control interfacing, SCADA. **(15 Lectures)**

**Unit II**

System modeling and identification, Mathematical model for processes, first order, and second order processes without and with pure delay, higher order systems, pulse testing for process identification, linear least square algorithm. Implementation of digital controller. Digital temperature control system, digital position control system, stepping motors and their control. **(15 Lectures)**

**Unit III**

Concept of feedback, State space analysis, Linear and Non-Linear control, Controllability and Observability using Kalman test. State space equations. **(15 Lectures)**

**Unit IV**

Adaptive control, Self-Tuning, Gain Scheduling, Model Reference Adaptive Control, Self-Tuning Regulator, Feed forward Control, Cascade Control. **(15 Lectures)**

**Recommended Books:**

1. Instrumentation and Process Control by Terry Bartelt.
2. Modern Electronic Equipment: Troubleshooting, Repair and Maintenance by Khandpur, TMH 2006
3. Instrument Engineer's Handbook Process Control by Bela G. Liptak
4. Instrumentation for Process Measurement and Control by Norman A Anderson

**List of Practical's (EEM-DSE-1B)**

*Practical work includes the detail explanation of all the circuit components and blocks of the system are included. A full demonstration of all the systems is a must before proceeding with the hands on experimentation. Atleast 10 experiments from the following:*

1. Determine the time constant and transfer function of first order process using P.C. simulator.
2. To observe time response of closed loop second order process with proportional control.
3. Study time response of PI Controller
4. Study time response of PID Controller
5. Study the pressure control loop, pressure source control system
6. Study typical level control loop having level transmitter, motorized control valves.
7. Study air duct flow monitoring and control
8. Study PLC and design using digital ladder logic programming
9. Study DCS based Instrumentation 10. Study SCADA based instrumentation.

**6<sup>TH</sup> SEMESTER**  
**DISCIPLINE SPECIFIC ELECTIVES (DSEs)**

**OPTION - II**

**EEM616DB: EEM: AUDIO VIDEO AND OFFICE EQUIPMENT-II**

**(CREDITS: THEORY-04, PRACTICALS-02)**

**Unit I**

Audio Systems Construction, principle of working and typical applications of: AM and FM radio receiver, receiver ICs, receiver characteristics and alignment, Use of these Receiver principles in mobile phone, satellite receiver (dish TV receiver) etc. High fidelity music systems, Principles of recording and replay of audio CD and ACD player. Blu-Ray player, Remote controls for these units, MP3 player, process of downloading mp3 in it. Different audio file formats and their comparison. **(20 Lectures)**

**Unit II**

Video Systems Construction, principle of working and typical applications of: Principles of TV transmission, vestigial sideband transmission, standard TV channels in India.(Brief Review).Principles of scanning and synchronization, composite video signal, B/W TV receiver Block diagram. (Brief Review) Principles of color TV transmission and PAL-B color standard. Block diagram of color TV, B/W and color picture tubes. **(15 Lectures)**

**Unit III**

Purpose of changing over from analog to digital TV and its timeline, the new Digital TV standards, SDTV / HDTV, Set-top box for cable TV and for DTH Construction of LCD and plasma panels for TV application. Working of LCD and plasma displays. Block diagram of digital LCD and plasma TV. Video monitors-CRT and LCD. **(15 Lectures)**

**Unit IV**

Basic information of VCD and DVD. Block diagram of VCD player and DVD Player. Applications of TV, Typical Automotive infotainment system - block diagram Public address system and its components, Home Theater, Car entertainment system. **(10 Lectures)**

**Recommended Books:**

1. Electronic Instruments and Systems: Principles, Maintenance and Troubleshooting by R. G. Gupta Tata McGraw Hill Edition 2001
2. Modern Electronic Equipment: Troubleshooting, Repair and Maintenance by Khandpur, TMH 2006
3. Consumer Electronics by S P Bali, Pearson 2008.
4. Standard Handbook of Audio and Video Engineering by Jerry Whitaker and Blair Benson

**List of Practical's (EEM-DSE-2B)**

*Practical work includes the detail explanation of all the circuit components and blocks of the system are included. A full demonstration of all the systems is a must before proceeding with the hands on experimentation. Atleast 10 experiments from the following:*

1. Experiments on AM/FM radio receiver and its alignment.
2. Experiments on Music system: Study of hi-fi amplifier {LM 380}, stereo system, graphic equalizer, speaker system
3. Experiments on Color TV receiver: Observation of waveforms and voltages at various test points.
4. Tracing and study of block diagram of LCD TV/ Plasma TV. Group B Setting up, preventive maintenance, minor repairs and fault identification.
5. Experiments on MP3 player: Study of block diagram and various controls, downloading of songs CD/DVD player: Identification of parts, study of various controls group parts.

**6<sup>TH</sup> SEMESTER**  
**DISCIPLINE SPECIFIC ELECTIVES (DSEs)**

**OPTION - III**

**EEM616DC: EEM: MAINTENANCE CONCEPTS, INSTRUMENTS AND APPLIANCES-II**

**(CREDITS: THEORY-04, PRACTICALS-02)**

**Unit I**

Language of Electrical Measurements, Experimental Data and Errors Measurement Recording and Reporting, Graphical

Representation of Data, Precision and Accuracy, Resolution and Sensitivity, Errors in Measurement, Statistical Evaluation of Measurement Data and Errors. **(15 Lectures)**

**Unit II**

Emergency lights, Circuit breakers, Home protector, spike protector, Stabilizers, Online UPS and Off Line UPS Standard operating method and safety precaution of - AF signal generator, RF signal generator. **(15 Lectures)**

**Unit III**

Standard operating method and safety precaution and simple indicative numerical problems of Digital Clock (watch), Microwave oven, Mixer, grinder, Roaster, Electric geyser, Electric iron, Telephone instrument, Headphone, Hearing aids, Electronic ignition system, Washing machine, induction cooker. **(15 Lectures)**

**Unit IV**

Electrochemical cells – Chargeable, non-rechargeable, AA, AAA, Button, Cellphone battery, Typical voltages, AmpHour rating, precautions during use and disposal Tools: Screw-drivers, Allen key, Automatic Centre punch, files, cutters, pliers, wire strippers, hacksaw, soft tools(chemicals for electronics). **(15 Lectures)**

**Recommended Books:**

1. Troubleshoot And Repair Major Appliances By Eric Kleinert
2. Student Reference Manual for Electronic Instrumentation Laboratories by Stanley Wolf, and Richard F.M. Smith, Prentice Hall of India Pvt. Ltd. New Delhi.
3. Electronic Instrumentation and Measurement Techniques by WD Cooper, AD Helfrick, Prentice Hall of India Pvt. Ltd. New Delhi.
4. Digital Instrumentation A. J. Bouwens, Tata McGraw Hill.
5. Battery reference book by T.R.Crompton.

**List of Practical's (EEM-DSE-3B)**

*Practical work includes the detail explanation of all the circuit components and blocks of the system are included. A full demonstration of all the systems is a must before proceeding with the hands on experimentation. Atleast 10 experiments from the following:*

1. Troubleshoot and repair MCB, ELCB (Demonstration of operation by creating test fault condition).
2. Working operation of Spike protector
3. Experiments on PMMC/ Analog multimeter /Digital multimeter.
4. Repairing of Single Power Supply or Dual Power Supply.
5. Repairing Electrical appliances such as electric fan, geysers, iron, motors etc.
6. Study of Electrical Wiring (including drawing schematic) of Home appliances (Schematic, Identification of parts, disassembly and assembly).
7. Experiment on repair of Tube light.
8. Experiment on recharging of battery.
9. Experiments on Error calculation (relative and absolute) using LVDT, Strain Gauge.
10. Study the working of UPS and inspect the components.