COURSES FOR M. TECH. IN ELECTRONICS DESIGN AND TECHNOLOGY

(Approved by 3rd Academic Council held on 21–06- 07 Res. No.AC.03/2007/1/3.1)

Semester - I

<table>
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<tr>
<td>EL-517: Physical and Industrial Design of Electronics Systems</td>
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<td>*EL-533: Data Communication &amp; Networks</td>
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Total Credit = 24

Semester - II

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<td>EL-530: VLSI Design.</td>
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Total Credit = 25

Semester – III & IV

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Total Credit = 24
DETAILED CURRICULUM

SEMESTER-I

EL-517: Physical and Industrial Design of Electronics Systems.


BOOK SUGGESTED

4. Sameer notes on Ergonomics & Human Interface.

EL-531: Design of Digital Systems.


BOOK SUGGESTED

**EL-521: Design & Technology of Electronics Devices.**
Review of microelectronic devices, introduction to MOS technology and related devices. MOS transistor theory, scaling theory related to MOS circuits, short channel effect and its consequences, narrow width effect, FN tunnelling, Double gate MOSFET, Cylindrical MOSFET, Basic concept of CMOS circuits and logic design. Circuit characterization and performance estimation, important issues in real devices. PE logic, Domino logic, Pseudo N-MOS logic-dynamic CMOS and Clocking, layout design and stick diagram, CMOS analog circuit design, CMOS design methods. Introduction to SOI, Multi layer circuit design and 3D integration. CMOS processing technology: Crystal grown and Epitaxy, Film formation, Lithography and Etching, Impurity doping, Integrated Devices.

**BOOK SUGGESTED**

**EL-523: Advanced Programming Language.**

Introduction to Object Oriented Programming (OOP) & its applications, Differences between OOP and Procedure-Oriented Programming (POP), System Input/Output streams, Functions, Defining Classes and Objects, Constructors and Destructors, Operator Overloading, Function overloading, Inheritance, Pointers, Virtual functions, Polymorphism, Templates and exception handling, Managing console I/O operations, Working with files, Graphics Programming.

Introduction to MATLAB, and its Applications, Executable C code in MATLAB Programming (Laboratory will be based on C++ and MATLAB)

**BOOK SUGGESTED**
1. E. Balaguruswamy: *Object Oriented Programming with C++,* TMH, New Delhi, 2001
EL-533: Data Communication & Networks


Data Signaling: Encoding of Digital Data to Digital signal, Digital Data to Analog Signal, Analog Data to Analog signal and Analog Data to Digital Signal. Spread Spectrum Signaling, Data Communication Interface, Data Link control-stop & wait protocol, sliding window protocol, select & reject ARQ etc., Multiplexing – FDM, TDM, WDM.


BOOK SUGGESTED

EL-535: Information Systems.


BOOK SUGGESTED
SEMESTER - II


BOOK SUGGESTED
2. Davidson, K. Handbook of Precision Engineering, Vol-7.(PhilipsTechnical Library)
4. Srinivasan, H. P., Stepping Motors. (Lecture Notes, CEDT, IISc Publication)
5. Heck, C, Magnetic materials & Their Applications (Butter Works)
6. M. H. Rashid, Power Electronics Circuits, Drives & Applications. (PHI)

EL-530: VLSI Design.


BOOK SUGGESTED

EL-532: **Intelligent Instrumentation.**

1. Intelligent sensors: Definitions- Classical sensors and transducers, Smart sensors, Cogent sensors, Self adaptive sensors, VLSI-ANN sensors, MEMs , Computational sensors, Integrated intelligent sensors (ISS), Passive and active elements, AD and DA conversions, Micromachining sensors, Thermocouple and RTD signal processing-Cold junction compensation, Integrated compensating ADC, Realization of differential temperature, Temperature compensation in Resistive strain gauge sensors- Integrated compensating DAC, Calibration of IC thermal sensors- Integrated calibration and compensation in pressure sensors, Integrated offset, gain and nonliterary compensation


Transmission intelligence- Sampling ,Digitization and AD conversion, Signal conversion, Voltage to frequency conversion, Voltage to current conversion, 4-20mA transmitter, Capacitance/Inductance to duty cycle, Modulation, FM, PWM

Signal manipulation intelligence- Semantic transformation, Data validation, Missing data and data restoration, Decision making, Derived information

Artificial and adaptive Intelligence- Human intelligence, Array based sensors, Basic Sensor Metrics, Signal and image features, Prognostics diagnostics and predictive, Tracking, classification and discrimination, Adaptive least square models

Other Intelligences- Power saving, Voltage and current regulation, Reliability, Failure detection

3. Intelligent Sensor Standards and Protocols : IEEE 1451.1, Network communication models, STIM, Lon Talk TM Protocol, Integrated SAE J1850, MI bus, FieldBus,

BOOK SUGGESTED
2. Smart Sensors and MEMS by Sergey Y. Yurish, Maria T. S. R. Gomes, and Maria Teresa S.R. Gomes (Paperback - May 22, 2006)
3. Data Acquisition and Signal Processing for Smart Sensors by Nikolay V. Kirianaki, Sergey Y. Yurish, Nestor O. Shpak, and Vadim P. Deynega(Hardcover - April 11, 2002)
4. Understanding Smart Sensors (Artech House Sensors Library) by Randy Frank (Hardcover - April 2000)
5. Microsensors, MEMS and Smart Devices by Julian W. Gardner, Vijay Varadan, and Osama O. Awadellkarim(Hardcover - Dec 15, 2001)
EL-534: Modeling and Simulation.
Behavior simulation using VHDL, HDL, PALASM, etc. Logic minimisation, Gate level simulation using view-logic, ORCAD etc., Circuit simulation - DC, Transient, AC analysis using SPICE etc. Model cards/description of various devices convergence, circuit cards/description, mixed mode simulation. Re-optimisation of the circuit & automatic list pattern generation. Fault simulation.

BOOK SUGGESTED
1. Technical Literature & Manuals on VHDL, HDL, PALSM, ORCAD, SPICE, HLD link etc.

EL-536: Application Software.

BOOK SUGGESTED
2. Leison, M., System Analysis & Design. (Science Research Associates, 1985)
3. Cantu, Mastering Delphi.
4. Hall, Teach Yourself Delphi.

The student will develop a project with the following concept in mind:

- System Design.
- Functional Design.
- Circuit Design.
- Software Design.
- Mechanical Design.
- Thermal Design.
- Reliability.
- Testing.
- Maintainability.
- Scale of Production.
- Manufacturing Technology.
- Assembly Method.
- Ergonomics.
- Value Engineering.
- Sales, Servicing & Marketing.

The students will develop a product that is potentially marketable, starting from conceptual level to the production prototype stage while evaluating alternate solutions & design to engineer a product. The student must acquire information of design methodologies & tools to complete the project in given time frame.