SEMESTER VI

El 601 COMMUNICATION ENGINEERING

Module I

Introduction to various communication systems -Modulation -Different types of, modulation -AM- Expression -modulation index -bandwidth -AM Modulator (Block c level treatment)- Introduction to DSBSC, AM Balanced Modulator (Block level treatment) SSB, VSB -FM -Expression- Modulation Index -Bandwidth -Carson's rule -FM Modulator (Block Level treatment) -Phase Modulation -Comparison between FM iQ and PM -Annstrong Modulator (Block level treatment)

Transmitters (Block level treatment) AM Transmitter -Low level -High Level -FM Transmitter- FM Stereo Transmitter -Receivers -(Block level treatment only) -AM receivers -TRF- Super -Heterodyne receiver -Image frequency -Envelope detector -FM receiver- FM Stereo receiver -Pulse Modulation Systems -PAM -PWM -PPM.

Module II

Radiation and propagation of waves: (analysis not required) -Electro magnetic Radiation -Waves in free space -polarization -Reception -Effects of Environment -Propagation of waves: Ground waves -Sky -Way propagation -Space Waves -Antennas -Basic consideration -Wire radiator in space -Common terms and definitions -Effects of Ground on Antennas -Directional High frequency Antennas -UHF -Microwave antennas -Wide band and Special purpose antennas.

Module III

Micro wave techniques (analysis not required) -Microwaves in perspective Transmission lines -Wave guides -Cavity resonators -.Microwave semiconductors - Microwave tubes - Microwave antennas -Satellite Communications: Satellite orbits -~ Satellite communication Systems- -Satellite sub systems -Earth stations.

Module IV

Fiber optic communication Light -light wave communication systems -Fiber optic cable - Optical Transmitters and Receivers .

Modern communication Applications: Facsimile- Cellular Radio Systems -Radar - Television.

Text Books:

For Modules I, II .

Electronic Communications: Dennis Roddy and John Coolen, Prentice Hall ,India

For Modules III & IV

Communication Electronics: Frenzel , MGH.

References:

Electronic Communication Systems: Kennedy & Davis -Fourth Edition -Tata McGraw Hill Publishing Company Ltd.

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.

Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

El 602 PROCESS CONTROL INSTRUMENTATION I

Module I

Level measurement -Simple methods. Visual indicators, float actuators, electrical resistance and static pressure type. Principle of operation. Level switches - Linearisation techlliques for level sensors. Ultrasonic and capacitor type level measurement. Measurement of level of solids -Paddle wheel type. Le\'el measurements using pressure sensors -diaphragm.

Measurement of humidity -Hygrometer various types -Dew cells -Measurement of moister -Conductance type -Capacitance type -Spectral type.

Module II

Viscometry -different types of viscosity meters -consistency measurement -Pneumatic and electrical signal conditioning control of viscosity and consistency. PH meters -hydrogen, Ion concentration -Definition of PH value -Acidity -Alkalinity -PH measurement -calomel electrodes -PH measurement and electronic PH meter -Digital PH meters

Module III

Analysers -Gas analyser -Biochemical abs chemical reactors -Heat of reactors by ma calorimetry -Infrared and Ultra violet me Instrumentation Symbols and diagrams.

Analytical Instruments- Radiant energy types -X-ray detecting method and proportional counters -Geiger Muller Counter -Scintillation counters -spectrometers. Industrial Weighing- Pneumatic and electrical weighing -on line weighing and control Automatic bagging and bottling

Module IV

Pumps -Different types other than vacuum pumps construction -Characteristics -Efficiency specifications and typical applications with calculation -Control of centrifugal, rotary, reciprocating pumps -Throttling and on-off control.

Effiuent and water treatment -Chemical methods -Oxidation, reduction and neutralization -Biological methods of control.

Control schemes for compressors with special reference to surge control

References:

I) Principles of Industrial Instrumentation -D PTRANABIS
2) Industrial Process measuring instruments -G.C. CARROL
3) Transducers and Display Systems -Dr. B S SONDE
4) Measurement Systems -D.O. DOEBELIN

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.

Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

EC/EI 603 VLSl DESIGN

MODULE I.

VLSI process integration: -fundamental considerations in IC processing -NMOS IC technology -CMOS IC.technology -BiCMOS IC technology. -GaAs technology. Ion implantation in IC fabrication.

The MOS device: (n -channel & p- channel) -capacitance of MOS structure - accumulation, depletion and inversion. threshold voltage, current equations - characteristics, channel pinch-off.

Second order MOS device effects: short-channel effect, narrow width effect, sub-threshold current, device, saturation characteristics.

MODULE II.

Switch logic- pass transistors and transmission gates, Gate logic- The basic inverter using NMOS-circuit -current equations -pull up to pull down ratio- transfer characteristics- Alternate forms of pull up. Basic NAND, NOR, circuits. The CMOS inverter, characteristics -NAND, NOR and compound circuits using CMOS. Other forms of CMOS logic: pseudo CMOS, CMOS domino logic, n-p logic. Layout design of static MOS circuits -Layout rules -general principles & steps of lay-out design -use of stick diagrams -design rules -Layout examples of NAND and NOR.

MODULE III.

Basic circuit concepts: sheet resistance: area capacitance, delay unit, inverter delays - driving large capacitive loads, cascaded inverters, super buffers, BiCMOS drivers. Combinational circuits -clocked sequential circuit - drivers for bus lines. Scaling of MOS circuits: scaling models and scaling factors for device parameters.

MODULE IV.

Timing issues in VLSI system design: timing classification- synchronous timing basics - skew and jitter- latch based clocking- self timed circuit design -self timed logic, completion signal generation, self timed signaling- synchronizers and arbiters.

TEXT BOOKS :

I. Douglas A. Pucknell. Kamran Eshraghian .Basic VLSI Design, Prentice Hall lndia. 2nd.ed

2. Jan M. Rabaey. A. Chandrakasan, B. Nikolic, Digital Integrated Circuit- A Design perspecive, Pearson education, Prentice-Hal1 India Ltd. rd ed

REFERENCES:

I. Thomas E. Dillinger .VLSI Engineering .Prentice Hall International edition.

2. S M Sze. VLSl Technology:. Mc Graw Hill, 2nd ed.

3. Weste and Eshraghian. Principle of CMOS VLSI Design: ,A system. Perspective, Pearson Education 2nd ed.

4. Mead & Conway. introduction to VLSI system Design. Addison-Wesley Publishing Co.. 1980

5. Fabricius. Introduction to VLSI Design. McGraw-Hil1, 1990

1. Charles II Roth Jr, fundamental. of Logic Design, 'Thomson Learning. 5th ed.

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.
Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

El 604 INDUSTRIAL INSTRUMENTATION II

Module I

Measurement of Pressure:-Introduction-Units and definitions-Standards of pressure-pressure and vacuum. Pressure measuring elements-Bourden gauge-Mcleod gauge-Float type pressure gauges-Knuden gauge-Momentum transfer gauges-.thermal conductivity gauge-pirani gauge. Dynamic effect of volumes and connecting tubing -dynamic testing of pressure measuring systems. Pressure measuring strain gauges. Differential pressure ;-elements-U tube manometer -Inclined manometer -Ring balance type manometer-Bellows-principle of operation, theory and construction-Pressure transducers-diferential pressure transducers-pneumatlc and electncal pressure transmitter-Pressure swltches-very high pressure measurement (70 kPa) transducer-Pressure regulation and control-Pressure signal multiplexing.

Module II

Differential pressure meters:-Orifice plates flow-turbulent flow-pitot tube-installation p registering instruments-wet and dry type. square root compensation-pressure trans measuring units-selecting position and inst meters for liquids and gases-principle of ope theory-principles of operation and construction

Module III

Density measurement, different methods of applications-continuous weight measurement in conveyor belts-strain gauge load cell melthod Pneumatic, Hydraulic, load cells Different methods of weight measurement-float principles -Air pressure balance method , -Gamma rays method -Future trends. measurement ofturbidity-Principles, different methods, and applications.

Module IV

Power plant instrurnentation:-Scheme of a typical power plant. Pressure, temperature flow and level. Vibration and expansion. Analyzers-flue gas analysis. Nuclear power plant instrumentation-safety measures pneumatic instrumentation. Thermal power plant instrumentation.

Control valves: final control operation-electrical and pneumatic Signal conversion-actuators-different types of automatic control valves. Butterfly valves-ball valves-v ball valves, glob valves-plug valves, gate valves (brief study)

Positioner and advantages of using positioner. Solenoid valves.

References:

I) MeasurementSystem application & design Earnest O-Deobelin-Mc Graw Hill -
2) Industrial Instrumentation-Donald P.Eckman-Vilky Eastern Ltd
3) Mechanical & Industrial measurements-R K Kain-Khanna Publishers
4. Prillciples ol.lndustrial Instrumentation-D.Palranabis- Tala Mc Graw Hill
5) Measurement and control of temperature in industry- Yoyd R Constable
6) Pyrom~lry-Wood J P and Cooler. J M Tata Mc Graw Hill
7) Measurement System application and design-Eamest.O.Doeblin Tata Mc. Graw Hill
8) Process control instrumentation technology-Austin D Johnson-John Wiley & Sons
9) Instrument engineers handbook-third edilion-Process control-Bela-G.Lpitak-Butterworth Heinemann-Distribution Asian books New Delhi
10) Process control-Donald P Eckman
11) Instrument engineers handbook-third edition-Process measurement and analysis-. Bela- G.Liptak-Butterworth Heinemann-Distribution Asian books New Delhi

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.
Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

CS/EB/EC/EI 605 CONTROL SYSTEMS ENGINEERING

MODULE I.

Basic idea of control systems and their classification -differential equations of systems -linear approximation .Laplace: transform and transfer function of linear 3ystem -Model of physical system (Electrical, mechanical and electromechanical) block diagram -signal flow graph -Mason's gain formula.

MODULE II.

Time domain analysis -Representation of detenninistic signals -First order system response -S-plane root location and transient response -impulse and step response of second order systems -perfonnance - charactcristic~ in the time domain -effects of derivative and integral control -steady state response -error constant -I!cneralised definition of error coefficients -concepts of stability -Routh -Hurwitz criterion.

MODULE III

Frequency domain analysis -frequency response -Bode plot, Polar plot, Nicol's chart -closed loop frequency'S response and frequcncy domain perfonnance characteristics. Stability in frequency domain. Nyquist criterion.

MODULE IV

Root locus method -basic theory and propertIes of root loci -procedure for the construction of root loci-complete root locus diagram. Design and compensation of feed back control system :- approaches to Icompensation -cascadc compensation networks and their design in the frequency domain -simple design in S-plane

TEXT BOOK:

I. Ogata K. Modern Control Engineering, Prentice-HallIndia Ltd /Pearson Education, 4th ed

REFERENCES:

1. Dorf. Modern Control system. Pearson Education, 8th ed.
2. Franklin. Feed back Control.S:vstem.\,. Pearson Education
3. Kuo B. C, Automatic COIltrol System. Prentice-Hall India Ltd, 8th ed.
4. Nagoor Kani. Control S.vstems, RB Publishers. 1998
5. Ogata. Di.\.crefl' Ti,ne Col/trul Systems. 2nd edn., Pearson EducationJ Prentice-
6. Nagarath & Gopa!, Colltrol System Engineering. Wiley Eastern, 2nd ed.
7. Ramkayan. Control Engineering, Vikas Publications, 2007
8. M N Banrlyopadhyaya. Control Engineering- Theory & Practice, Prentice-Hall
9. Glad. Control Theory Thomson Learning. 2000

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.

Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

EC/EI 606 EMBEDDED SYSTEMS

MODULE I

Overview of embedded System:- Embedded System. Categories of Embedded System, Requirements of embedded systems challenges and issues in embedded software development, Applications of Embedded ,systems in consumer electronics, Control System, Biomedical Systems. Handheld computers, communication devices

MODULE II -

Embedded Hardware & Software Development Environment: -Hardware Architecture, Micro controller : architecture, Communication Interface Standards, Embedded System Development Process, Compilers and assemblers, Embedded Operating systems, Types of Embedded Operating systems.

MODULE III

Embedded system Design: Microchip PICl6 family, PIC16F873 processor architecture-features, memory organization, on chip peripherals, Watchdog timer, ADC, Data EEPROM, Asynchronous serial port, SPI mode, 12C mode.

Development systems and compilers for PIC micro controllers. Interfacing with LCD, ADC, sensors, stepper Rotor. key board, DAr:. Examples for data acquisition and control

MODULE IV

Real Time & Database Applications: -Real- Time Embedded Software Development, Sending a Message over a serial Link, Simulation of a Process Control System, Controlling an Appliance from the RTLinux System, embedded Database Applications with examples like Salary Survey, Energy Meter Readings.

TEXT BOOKS :

L. Programming for Embedded systems- Dream tech Software Team, Wiley Dream tech, 2002

2, Rajkarnal, Microcontro//ers -Architecture. programming. Interfacing and system Design, Pearson Education, 2005 -

3, Nebojsamatic, 77Ie PIC MicroconJrol/er. Mikro Elekronica.

REFERENCES:

I. Daniel w. Lewis. Fundamentals of Embedded Software where C and Assembly Meet, PHI Ltd. 2003

2. DSIOI374: National Semiconductor reference manual.

3. Embedded I RealTime systems: Concepts. Design and programming, Dream tech Software Team, Wiley Dream tech. 1993

4. Bamett Cox & O'Cull, Embedded C Programming and the Microchip PIC, Thomson Learning, 2004

5. 1 187D: Atmel semiconductor reference manual.

6. www.atmel.com

7. DS30292B: .Microchip reference manual.www.microchip.com

8, Rajkamal, tinbedded .S:v.\lems -Architecture, Programming and Design , Tata McGraw Hill, 2005

9, Steve Heath, Embedded .Systems Design, Elsevier India Pvt. Ltd., 2ed ed.

10. Jack R, Smith, Programming the PIC Microcontroller with M Basic, Elsevier, 2007

II. Wayne Wolf. Computer,as Components: Principle. of Embedded computer system Design, Elsevier, 2005

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.
Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

El 607 INSTRUMENTATION LABORATORY II

PART -A (BOTH I& 2)

.1. PLL Measurement of Capture range, Lock range, Use as FM discriminator and frequency synthesizer
2. Familiarisation with Analog multiplier IC, use as AM modulator and frequency doubler.

PART -B.
Measurement of viscosity
Measurement of temperature
Measurement ofpH.
Measurement of pressure
Dynamic response of first order system
Dynamic response of second order system
Pressure to current & Current to pressure converter
Use of L.D.R. for measurement of physical variation
Measurement of strain /force
Measurement of speed
Atleast five topics from part B has to be covered.

PART -C*
SCR characteristics
SCR triggering circuits
Phase controlled rectifiers
Dc motor speed control
Chopper circuits
Power transistor characteristics
Power MOSFET characteristics
Simple inverter circuits
Microprocessor based motor control
* Atleast five topics from part C has to be covered.

Note: 50% Marks is earmarked for continuous evaluation and 50% marks for end semester examination to be assessed by two examiners. A candidate shall secure a minimum of 50% marks separately for the two components to be eligible for a pass in that subject.

El 608 MINI PROJECT

Each batch comprising of 3 to 5 students shall design, develop and realize an electronic product. Basic elements of product design must be considered. Fully software/simulation projects are not allowed. Each student shall submit a project report at the end of the semester. The project report should contain the design and engineering documentation including the bill of materials and test results. Product has to be demonstrated for its full design specifications. Innovative design concepts, reliability considerations taken care of in the project shall be given due weight

Guidelines for Evaluation

a) Attendance & regularity	10
b) Work knowledge & involvement	30
c) End semester presentation & Oral examination	20
d) Level of completion & demonstration of functionality	25
e) Project Report	15
Total	100

Note : External projects & R&D projects need not be encouraged at this level. Points (a) & (b) to be evaluated by the project guide & co- ordinator and the rest by the final evaluation team comprising of 3 teachers including the project guide.