RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA BHOPAL

Credit Based Grading System

Electronics and Instrumentation Engineering, VI-Semester

EI- 6001 Process Instrumentation

UNIT-I

Instrumentation in Hazardous locations: Area, material & temperature classification. Explosion proof enclosures, intrinsic safety, pressurization, non incendive systems. Combustible gas detectors. Enclosure classification - IP & NEMA standards.

UNIT-II

Temperature measurement: Temperature scales, ITS90, temperature calibrators and simulators, thermowell. Different types of thermometers: liquid in glass, bimetal, filled system, thermocouple, RTD, thermistors, IC temperature sensors, radiation thermometers, temperature switches, thermostats.

UNIT-III

Level measurement: Review of different level measurement methods and application considerations. Various level measurement devices: gauge glass, float & displacer type level sensors, D/P type level sensors, capacitive level sensors, ultrasonic & microwave level sensors, tape level gauges, servo level gauges, hydrostatic tank gauging systems, conductivity level sensors, radiation level sensors, vibrating level switches.

UNIT-IV

Flow measurement: Fluid properties, turbulent & laminar flow, Reynolds number, velocity profile, flow conditioners, influence of pressure & temperature on volume flow-rate, flow computers, totalization, flow calibration.

Different flow measurement techniques: differential pressure flowmeters, variable area flowmeters, magnetic flowmeter, mass flowmeter - Coriolis & thermal types, vortex shedding flowmeter, positive displacement flowmeter, turbine flowmeter, ultrasonic flowmeter, target flowmeter, insertion flowmeter, open channel flow measurement, , Criteria for selection of flowmeters.

UNIT-V

Smart transmitters - features & advantages, HART protocol.

Overview of sensor- actuator networks, field bus.

Some Suggested Textbooks/ Reference books:

1. H.N. Norton ,“Handbook of Transducers”
2. Principle of industrial Instrumentation – Patranabis
3. E.O. Doebelin ,“Measurement Systems Applications and Design”
4. DVS Murthy , “Transducers and Instrumentation”
5. Nakra and Chaudhary, “Instrumentation Measurement and Analysis”
6. Process Measurement & analysis - B.G. Liptak (Vol-I)
7. Electronic Instruments & Measurement - A. K. Sawhney
8. Instrumentation by D.S.Kumar.

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Electronics and Instrumentation Engineering, VI-Semester

EI- 6002 Power Electronics

Unit I

Power, Semiconductor Devices

Classification of Power semiconductor devices, characteristics, construction, application and theory of operation of power diode, power transistor, thyristors. Device specifications and ratings, working of Diac, Triac, IGBT, GTO and other power semiconductor devices. Turn-on / turn-off methods and their circuits.

Unit II

Rectifiers

Review of uncontrolled rectification an its limitations, controlled rectifiers, half wave, Full wave configurations, multiphase rectification system, use of flywheel diode in controlled rectifier configurations for different types of load.

Unit III

Inverters and Choppers

Classification of inverters, Transistor inverters, Thyristor inverters, Voltage and Current Communicated inverters, PWM inverters, Principle of Chopper, Chopper classification and their working, Regulators.

Unit IV

A. C. Voltage Controllers and Cycloconverters

Classification and operation of a.c. voltage controllers and cycloconverters, their circuit analysis for different types of load.

Unit V

Industrial Applications

Solid-state switching circuits, Relays, Electronic Timer, Battery charger, Sawtooth generator, Applications in Industrial process control, Motor drive applications, Electronic regulators, etc., Induction heating, Dielectric Heating, Resistance welding and welding cycle.

Suggested Text Books

1. Power Electronics: Devices, Circuits & MATLAB Simulations, Alok Jain, Penram Int. Publication.
2. Power Electronics, Converters, Applications & Design - Need Mohan et.al., Wiley
3. Power Electronics Circuits, Devices & Applications - M.H. Rashid, PHI.
4. Power Electronics and its Applications, 3rd edition, Alok Jain, Penram Int. Publication.
5. Semiconductor Power Electronics- CM Pauddar

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Electronics and Instrumentation Engineering, VI-Semester

EI- 6003 Microcontrollers Theory & Applications

Unit-I

Intel family of 8 bit microcontrollers, Architecture of 8051, Pin description, I/O configuration, interrupts; Interrupt structure and interrupt priorities, Port structure and operation, Accessing internal & external memories and different mode of operations, Memory organization, Addressing modes, instruction set of 8051 and programming.

Unit-II

8051 interfacing to LED, LCD, ADC and DAC, Stepper motor interfacing. Timer/ Counter functions, 8051 based data acquisition system, 8051 connections to RS-232, 8051 Serial communication, Serial communication modes, Serial communication programming, Serial port programming in C.

Unit-III

Overview of 16 bit 8096 microcontroller architecture, Types of Microcontrollers their Selection and Applications of Microcontrollers. RISC/CISC and Harvard/Princeton Architectures.

Unit-IV

ARM 32-Bit MCUs: Architecture, Programming, and Development Tools.

Unit-V

Different Bus Configuration used for industrial automation- RS232, UART, SPI, RS485, GPIB, CAN, USB, I2C.

Suggested Text Books:

1. 8051 microcontroller – Kenneth J. Ayala, Penram International, 3rd edition
2. 8051 Microcontroller and embedded systems – M. Mazidi, Pearson Higher Education
3. Programming and Customizing the 8051 microcontroller – Myke Predko, TATA McGraw Hill Edition.
4. Embedded System - Raj Kamal, TATA McGraw Hill Edition

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Electronics and Instrumentation Engineering, VI-Semester

EI- 6004 Digital Signal Processing

Unit – I

The Discrete Fourier Transform: Discrete Fourier series, Discrete Time Fourier Transform(DTFT),Discrete Fourier Transform (DFT), properties of DFT, circular convolution, linear convolution using the DFT.

Unit – II

Computation of the Discrete Fourier Transform: Goertzel algorithm, FFT algorithms: Decimation in time (DIT) and Decimation in frequency (DIF), Comparison of DIT and DIF algorithms, Computation advantages of FFT Algorithms, Chirp Z transform (CZT).

Unit – III

FIR filter Design

Introduction to Digital filters, Types of digital filters: FIR and IIR filters,
FIR filter specifications, FIR filter design: Window method, Frequency Sampling method, Optimal filter design method, Realization structures for FIR filters, Finite wordlength effects in FIR filters.

Unit-IV

IIR filter Design

Comparison of IIR and FIR digital filters, IIR filter specifications, IIR filter design methods: Impulse Invariant method, Bilinear Transformation method, Matched
Z-Transform method, Realization structures for IIR filters, Finite wordlength effects in IIR filters.

Unit-V

Discrete Random Signals: Discrete time random process, averages spectrum representations of infinite energy signals, response of linear system to random signals.
Power Spectrum Estimation: Basic principles of spectrum estimation, estimates of the auto covariance, power spectrum, cross covariance and cross spectrum.

References Books:

1. A.V.Oppenheim and R. W. Schafer," Digital Signal Processing", Prentice Hall
2 .L.R.Rabiner and B. Gold," Theory and Application of Digital Signal Processing" 3. S.Salivahanan, "Digital Signal Processing"

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Electronics and Instrumentation Engineering, VI-Semester

Elective II -EI- 6005 (1) Strategic and Knowledge Management

UNIT –1

Basic concepts of strategic management, evolution , introduction , nature ,Why strategic management, strategic approach, importance ,characteristics ,elements, process , model , limitations and pitfalls ,benefits, reasons for poor strategic planning, guidelines for effective strategic management**.**

UNIT – 2

Strategy and tactics, elements of strategy, nature multiple aspects of strategy, good strategy, levels schools of thought on strategy, approaches to strategy formulation ,design approach, learning /experience approach, power approach ,ideas approach, implications for strategic development.

UNIT-3

Corporate strategy , marketing strategy, market penetration, strategic leadership, its importance ,analyzing leadership, role of a strategic leader, leader's tasks, leadership approaches, leadership style , research and development , corporate social responsibilities, responsibilities of business, need for CSR, areas of corporate responsibility**.**

UNIT – 4

Knowledge management, knowledge society, Indian knowledge root, Information ,data ,wisdom, grey revolution, forms of knowledge, knowledge asset, knowledge Gap, knowledge management practices, knowledge transfer ,retaining knowledge workers, motivation and communication.

UNIT – 5

Meaning of Entrepreneur, Functions of an Entrepreneur, Types of Entrepreneur, Entrepreneur-an emerging Class, Development of Entrepreneurship; Stages in entrepreneurial process; Role of entrepreneurs in Economic Development; Entrepreneurship in India; Entrepreneurship – its Barriers.

Books and References-

1. Strategic Management and Business Policy- C.Appa Rao, B. Parvathiswara Rao,K. Sivaramakrishna ,Excel Books, New Delhi, 2008
2. Business Policy and Strategic Management-Vipin Gupta**,**Kamala Gollakota, Srinivasan, Prentice Hall ,New Delhi,2005
3. Knowledge Management- Thothathri Raman, Excel Books, New Delhi, 2007.
4. Management & Entrepreneurship- N. V. R. Naidu, IK International, 2008.
5. Entrepreneurship Development – S.S.Khanka – S.Chand & Co3.
6. Management – Stephen Robbins – Pearson Education/PHI – 17^{t}

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Electronics and Instrumentation Engineering, VI-Semester

Elective II -EI- 6005 (2) Optical Instruments and Sensors

Unit-I

Introduction to vector nature of light, Propagation of light, Propagation of light in a cylindrical dielectric rod, ray model, wave model. Theory of image formation, Review of aberration, Comma, acclamation, distortion, Chromative aberration, Osages

Unit-II

Different types of optical fibres, model analysis of a step index fiber. Signal degradation on optical fiber due to dispersion and attenuation.

Unit-III

Optical fiber in instrumentation use of optical fibers as sensors, modulation techniques for sensors fiber optic power measurement. Stabilized calibrated light sources end-to-end measurement of fiber losses, optical signal processing.

Unit-IV

Optical power meters, optical attenuators, optical spectrum analyzer, optical switching & logic gate and measurement techniques like optical time domain reflectometry, (OTDR), attenuation measurements

Unit-V

Optical Sources & detectors: LED and LASERS, photo detectors, pin detectors detector responsitivity – noise, optical receivers. Integrated optical devices

Suggested Text Books:

1. An Introduction to Fiber Optics, Cherin
2. Optics by A.K. Ghatak, TMH
3. Optical fiber – System Technology, design and applications by C.K. Rao
4. Optical Fiber Sensors, Vol.12 by Culshaw B. and Dakin J. (Ed.), Arctech House
5. Fundamentals of Fiber Optics in Telecommunications and sensor, by B.P. Pal, Wiley Eastern
6. Optical Fiber Communication by G. Keiser, McGraw Hill
7. Optical Fiber Sensor technology, K.T.V. Grattan, B.T. Meggitt

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Electronics and Instrumentation Engineering, VI-Semester

Elective II -EI- 6005 (3) Advance microprocessors

Unit - I

Introduction to ARM processors and its versions, ARM7, ARM9 & ARM11 features, advantages & suitability in embedded application The Acorn RISC machine, ARM architechture, ARM7TDMI features, ARM7TDMI Interface signals, Memory Interface, Bus Cycle types, Register set, operational Modes, The ARM programmer's model, ARM development tools.

Unit - II

ARM Assembly Language Programming: ARM instruction types – data transfer, data processing and control flow instructions, ARM instruction set, Coprocessor instructions, Addressimg modes, Thumb programming model, Thumb instruction set, inline assembly in C, Embedded Assembly in C, ISRs in C.

Unit – III

3-stag pipeline ARM organization, 5-stage pipeline ARM organization, Understanding of ARM instruction execution, Exceptions in ARM.

Unit - IV

I/O Devices of ARM processor: General purpose I/O, Timers and counters, Watchdog timer, PWM device, Interrupt controllers, A/D and D/A converters, Serial communication devices.

Unit – V

Salient features of LPC 2148, Pin Description of 2148 CPU, Architectural Overview - Memory Mapping -BlockDiagram, features of different blocks LPC 2148 – Peripherals, Description of General Purpose Input/output Ports (GPIO) Features, register description & operation of PLL, timers, PWM, RTC, ADC, DAC & SPI.

Textbooks/ Reference Books:

1. ARM System Developer's Guide Designing and Optimizing System Software, Andrew N. Sloss, Dominic Symes, Chris Wright and John Rayfield, Elsevier, 2004.
2. ARM Architecture Reference Manual, David Seal, Pearson Education, 2007.
3. ARM System-on-Chip Architecture, Second Edition, by Steve Furber, Pearson, 2013

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Electronics and Instrumentation Engineering, VI-Semester

Elective II -EI- 6005 (4) IPR (Intellectual Property Rights)

Course Objective

Acquaint the students with the basic concepts of Intellectual Property Rights; and sensitize the students with the emerging issues in IPR and the rationale for the protection of IPR.

UNIT I Introduction

Introduction and Justifications of IPR, Nature of IP, Major forms of IP- *Copyright, Patent, Trade Marks Designs, Geographic indication, layout design of Semi conductors, Plant varieties, Concept & Meaning of Intellectual Property.*

Major international documents relating to the protection of IP - *Berne Convention, Paris Convention, TRIPS*. The World Intellectual Property Organization (WIPO).

UNIT II Copyright

Meaning and historical development of copyright , Subject matter , Ownership of copyright, Term of copyright, Rights of owner, Economic Rights, Moral Rights. Assignment and licence of rights, Infringement of copyright, Exceptions of infringement, Remedies, *Civil, Criminal, Administrative*, Registration Procedure.

UNIT III Patents

Meaning and historical development,. Criteria for obtaining patents, Non patentable inventions, Procedure for registration, Term of patent, Rights of patentee, Compulsory licence, Revocation, Infringement of patents, Exceptions to infringement, Remedies, Patent office and Appellate Board.

UNIT IV – Trade Marks, Designs & GI

Trade Marks: Functions of marks, Procedure for registration, Rights of holder, Assignment and licensing of marks, Infringement, Trade Marks Registry and Appellate Board.

Designs: Meaning and evolution of design protection, Registration, Term of protection, Rights of holder, unregistered designs.

Geographical Indication: Meaning and evolution of GI, Difference between GI and Trade Marks, Registration, Rights, Authorised user.

UNIT V Contemporary Issues & Enforcement of IPR

IPR & sustainable development, The Impact of Internet on IPR. IPR Issues in biotechnology, E-Commerce and IPR issues, Licensing and enforcing IPR, Case studies in IPR

Course Outcome:

1. Students will be able to understand Primary forms of IPR
2. Students will be able to asses and critique some basic theoretical justification for major forms of IP Protection
3. Students will be able to compare and contrast the different forms of IPR in terms of key differences and similarities.
4. Students will be able understand the registration procedures related to IPR.
5. Students will be exposed to contemporary issues and enforcement policies in IPR.

References:

1. P. Narayanan, Intellectual Property Law, Eastern Law House

2. . Neeraj Pandey and Khushdeep[Dharni, Intellectual Property Rights, PHI, 2014

3. N.S Gopalakrishnan and T.G. Agitha, Principles of Intellectual Property, Eastern Book Co. Lucknow, 2009.

4. Anand Padmanabhan, Enforcement of Intellectual Property, Lexis Nexis Butterworths, Nagpur, 2012.

5. Managing Intellectual Property The Strategic Imperative, Vinod V. Sople, PHI.

6. Prabuddha Ganguli, " Intellectual Property Rights" Mcgraw Hill Education, 2016.

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Electronics and Instrumentation Engineering, VI-Semester

EI- 6006 Process Instrumentation LAB

1. Experiment to obtain the pressure –displacementcharecterstics of flapper –nozzle amp. System.
2. To reduce the offset error of proportional controoller through process simulator.
3. To eliminate offset error using PI controller through process simulator.
4. cherecterization of PID controller through process simulator.
5. control of temperature of heating tank system using PI controller.
6. comperison of the controller cherecterstics using Ziegier –Nicolus tuning through process simulator.
7. Fluid level control using process simulator PCUSIM.
8. To verify the effect of proportional controller gainusing trainer kit.
9. To verify the effect of controller gain using proportional derivative trainer kit.
10. To verify and study proportionel plus derivative controller using traineer kit.
11. To verify and study proportionel plus derivative plus integral controller using traineer kit.

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Electronics and Instrumentation Engineering, VI-Semester

EI-6007 Creativity and Entrepreneurship Development

Course Objective:

- Understand and use tools for generating entrepreneurial ideas and problem solving.
- Understand and use tools for the selection of ideas.
- Understand and gain the skills that are needed to implement ideas in today's society
- Understand Entrepreneurship's part in process that includes idea generation and implementation.
- Understand the concept of Entrepreneurship and its place in today's society

Course Outcomes:

- Recognize an opportunity for a user group and frame an appropriate design challenge that addresses the need for the user.
- Practice observation, interview and empathy skills to evolve a thorough understanding of the needs of the user.
- Share and integrate team leanings.
- Generate, develop and describe creative ideas that address the design challenge.

Syllabus:

1. The concept of Entrepreneurship, its history and its place in society.
2. The concept of Entrepreneurship and its relation to concept of innovation.
3. Creative processes for idea generation and problem solving.
4. Business plan.
5. Role of creativity, innovation and business research.
6. Entrepreneurship opportunities in contemporary business environment.

Reference Books :

1. Dollinger M.J. "Entrepreneurship strategies and resources," 3rd edition Pearson Education New Delhi.
2. Panda, Shiba charan "Entrepreneurship development", Anmol publication New Delhi.
3. Richard Blundel & Nigel locket, "Exploring Entrepreneurship : practices & perspectives Oxford.
4. Charles E. Banford & Garry D. Bruton, "Entrepreneurship – A small business Approach, Mcgrawhill Education.
5. P. Narayana Reddy, "Entrepreneurship" : Text and cases, Cengage learning
6. Rajeev Roy, "Entrepreneurship" Oxford.