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B.Tech IV-II Semester (EIE)

S. No.	Course Code	Subject	L	T	P	C
1.	15A10801 15A10802	**MOOCS-II** a. Digital Image Processing b. MEMS and Its Applications	3	1	-	3
2.	15A10803 15A10804	**MOOCS-III** a. Mechatronics b. JAVA Programming	3	1	-	3
3.	15A10805	Comprehensive Viva Voce	-	-	4	2
4.	15A10806	Technical Seminar	-	-	4	2
5.	15A10807	Project Work	-	-	24	12
		Total:	**6**	**02**	**32**	**22**

2 Theory + 1 Comprehensive Viva voce + 1 Technical Seminar + 1 Project work
*Either by MOOCS manner or Self study or Conventional manner

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B. Tech IV-II Sem. (EIE)

L	T	P	C
3	1	0	3

15A10707 TELEMETRY & TELECONTROL
(CBCC-III)

Course Objective:

- *The subject Telemetry and Telecontrol enables the students to understand how various process parameters in the industry are transmitted and controlled from remote place.*

Course Outcome:

- *The students shall apply the knowledge of transducers, communications, optical communications and satellite communication in understanding the subject. The students understand how process industry and automation plants are controlled from remote place*

UNIT I
TELEMETRY PRINCIPLES

Introduction, Functional blocks of telemetry, Classification of telemetry, design factors considered in selection of telemetry, cable telemetry-2 wire-3 wire-4 wire, pneumatic telemetry, hydraulic telemetry, mechanical telemetry, distance considerations, limitations, telemetry through power line carrier.

UNIT II
WIRELESS TELEMETRY

Functional block, frequency consideration, IRIG standard, line and channel coding, modulation codes, intersymbol interference, frequency division multiplexing-frequency modulation- FM and PM circuits, time division multiplexing- TDM/PAM-PAM/PM-TDM/PCM-PCM system, transmitter circuits, receiver circuits, PCM reception, interference, noise consideration. Bio telemetry. Study of migration of birds using telemetry. Case study.

UNIT III
SATELLITE TELEMETRY

Principle of satellite telemetry, block diagram, selection of frequency, telemetry tracking and command system, noise consideration, ship to shore telemetry using satellite, analog and digital transmission. Example of satellite telemetry system.

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UNIT IV

OPTICAL TELEMETRY

Principle of optical telemetry, block diagram, advantages, optical fiber cable, types of fiber cables, light transmission, sources and detector, transmission and receiving circuits, coherent optical fiber communication, power and link budget, losses, Case study.

UNIT V

TELECONTROL

Principle of Telecontrol, block diagram, design aspects, telecontrol instruments, analog and digital techniques in telecontrol, telecontrol using information theory. Remote adjustments, guidance and regulation. Example of Telecontrol system.

Text Books:

1. Telemetry principles by D. Patranabis, TMH.
2. Telecontrol Methods and Applications of telemetry and Remote control by G.Swoboda, Reinhold Publishing Corporation, London, 1991.

Reference Books:

1. Handbook of Telemetry and Remote control by L.Gruenberg, McGraw Hill, New York, 1987.
2. Telemetry Engineering by R.E.Young, Little Books Ltd, London, 1988.
3. Data Communication and Teleprocessing System by T. Housley, PH Intl, Englewood Cliffs, New Jersey, 1987.

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B. Tech IV-II Sem. (EIE)

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15A10708 PLC LABORATORY

Course Objective:

- *Students can understand the importance of computerization of process industries*

Course Outcome

- *Students can capable to use computers and PLC's in process systems*

1. Programming a PLC to demonstrate control of a device using one push button, Generating square wave etc.
2. Programming a PLC to demonstrate an operation of Batch process.
3. Configuring and Implementation of programmable PID controllers.
4. Control of a process using dead beat algorithm using simulation.
5. Control of a process using Dahlings algorithm using simulation.
6. PC based control of flow process.
7. PC based control of level process.
8. PC based control of pressure process.
9. PC based control of Thermal process.
10. Online Identification of process parameters from experimental data by least square estimate method.

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0	0	4	2

15A10709 MICROPROCESSORS AND EMBEDDED SYSTEMS LABORATORY

Course Objective:

To provide practical knowledge of Microcontrollers and concept Embedded Systems

Course Outcome:

Student shall be able to design and implement any Electronic Circuit with Micro Controller

1. Embedded systems lab Experiments using 8051
2. To develop program for basic mathematical operations.
3. To develop a program for block operations
4. To develop a program to generate square wave over port pins.
5. To develop a program to read keyboard and code
6. To develop a program to drive stepper motor
7. To develop a program for temperature indicator using ADC

Experiments using PIC Microcontroller

1) Asynchronous serial communication
2) Pulse Width Modulation (PWM) using CCP module
3) DC motor control

Microprocessors & Embedded Systems Lab Experiments

Phase1:

Normal programming

Phase 2:

Interfacing

Phase 1:

1. Design an assembly language program to perform the different arithmetic operations on the operands
2. Design a program for conversion of binded data to un-binded data.
3. Write a program which accepts input from key board and perform the factorial of the given input using interrupts.
4. Design a program which defines locality of the operands.
5. Write a program to reverse a given string.
6. Write a program to search a character in the given string.

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Phase 2:

1) Write an ALP to generate Sinusoidal Wave Using 8255
2) Interface 8251 (USART) with 8086.

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15A10801 DIGITAL IMAGE PROCESSING
(MOOCS-II)

Course Outcomes:

- Able to apply the Image processing concept for various fields of engineering and real life toprocess as per needs &specifications.
- Get the skills to heuristically develop new techniques to process images of any context.
- Can experiment, analyze & interpret imagedata /processing data.

UNIT–I

Introduction to Digital Image processing – Example fields of its usage- Image sensing andAcquisition – image Modeling - Sampling, Quantization and Digital Image representation – Basicrelationships between pixels, - Mathematical tools/ operations applied on images - imaging geometry.

UNIT–II

2D Orthogonal and Unitary Transforms and their properties - Fast Algorithms - Discrete FourierTransform - Discrete Cosine Transforms- Walsh- Hadamard Transforms- Hoteling Transforms ,Comparison of properties of the above.

UNIT–III

Background enhancement by point processing Histogram processing, Spatial filtering, Enhancement infrequency Domain, Image smoothing, Image sharpening, Colour image Enhancement

UNIT–IV

Degradation model, Algebraic approach to restoration – Inverse filtering – Least Mean Square filters,Constrained Least square restoration. Blind DeconvolutionImage segmentation: Edge detection -,Edgelinking, Threshold based segmentation methods – Regionbased Approaches - Template matching –use of motion in segmentation

UNIT–V

Redundancies in Images - Compression models, Information theoretic perspective- Fundamentalcoding theorem. Huffman Coding, Arithmetic coding, Bit plane coding, Run length coding, Transformcoding, Image Formats and compression standards.

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Text Books:

1. R.C .Gonzalez & R.E. Woods, "Digital Image Processing", Addison Wesley/Pearson education,3rd Edition, 2010.
2. A .K. Jain, "Fundamentals of Digital Image processing", PHI.

References:

1. Rafael C. Gonzalez, Richard E woods and Steven L.Eddins, "Digital Image processing usingMATLAB", Tata McGraw Hill, 2010.
2. S jayaraman, S Esakkirajan, T Veerakumar, "Digital Image processing", Tata McGraw Hill.
3. William K. Pratt, "Digital Image Processing", John Wilely, 3rd Edition, 2004.

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B. Tech IV-II Sem. (EIE)

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15A10802 MEMS AND ITS APPLICATIONS
(MOOCS-II)

Course Objectives:

- To study about fabrication processes involved in different types of sensors.
- To Study about characteristics of different MEMS materials.
- To get complete knowledge regarding working of MEMS Switches, relays, Inductors, Capacitors and Packing techniques associated with MEMS.

Course Outcomes:

After completion of this course the students will be able to

- Understand different steps involved in fabrication processes of different types of sensors.
- Understand characteristics of different MEMS materials.
- Get complete knowledge regarding working of MEMS Switches, relays, Inductors, Capacitors and Packing techniques associated with MEMS.

Unit-I:

MEMS Fabrication processes & Sensors:
Introduction, MEMS Overview, Micro-fabrication of MEMS: Surface Micromachining, Bulk Micromachining, LIGA, micromachining of polymeric MEMS devices, Three-dimensional micro-fabrications. Electromechanical transducers: Piezoelectric transducers, Electro-strictive transducers, Magneto-strictive transducers, Electrostatic actuators, Electromagnetic transducers, Electro-dynamic transducers, Electro-thermal actuators, comparison of electro-thermal actuation process, Micro-sensing for MEMS: Piezo-resistive sensing, Capacitive sensing, Piezoelectric sensing, Resonant sensing, Surface Acoustic Wave sensors.

Unit-II:

MEMS Materials and Fabrication techniques: Metals, semiconductors, thin films for MEMS and their deposition techniques, materials for polymer MEMS, Bulk micromachining for silicon based MEMS, Silicon surface micromachining, Micro-stereo-lithography for polymer MEMS.

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Unit-III:

MEMS Switches and Micro relays: Switch parameters, basics of switching, Switches for RF and microwave applications, actuation mechanisms for MEMS devices, bistable micro relays and micro-actuators, dynamics of switch operation, MEMS switch design considerations, modeling and evaluation.

Unit- IV:

MEMS Inductors and Capacitors: MEMS Micro-machined passive elements: pros and cons, MEMS Inductors: self and mutual inductance, micro-machined inductors, reduction of stray capacitance, improvement of quality factor, folded inductors, modeling and design issues of planar inductors, variable inductor and polymer based inductor. MEMS Capacitors: MEMS gap tuning capacitor, MEMS area tuning capacitor, Dielectric Tunable capacitors.

Unit-V:

MEMS packaging & MEMS RF Applications: MEMS packaging: Role of MEMS packaging, Types of MEMS packaging, flip-chip and multichip Unit packaging, RF MEMS packaging issues. MEMS RF applications: Micro-machined transmission line and components, micro-machined RF Filters, Micro-machined Phase shifters, and Micro-machined antenna, Gyros and Bio-MEMS.

References:

1. Gabriel M. Rebeiz, "RF MEMS: Theory, Design, and Technology," John Wiley & Sons, 2003.
2. Vijay K. Varadan, K. J. Vinoy and K. A. Jose, "RF MEMS & Their Applications," John Wiley & Sons, 2003.
3. Tai-Ran Hsu, "MEMS and Microsystems: Design and Manufacture," McGraw-Hill.

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B. Tech IV-II Sem. (EIE)

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15A10803 MECHATRONICS
(MOOCS-III)

COURSE OBJECTIVE:

- *To understand the interdisciplinary applications of Electronics, Electrical, Mechanical and ComputerSystems for the Control of Mechanical and Electronic Systems.*

UNIT I
MECHATRONICS, SENSORS AND TRANSDUCERS
Introduction to Mechatronics Systems Measurement Systems Control Systems Microprocessor based Controllers. Sensors and Transducers PerformanceTerminology Sensors for Displacement, Position and Proximity; Velocity, Motion,Force, Fluid Pressure, Liquid Flow, Liquid Level,Temperature,Light Sensors – Selection of Sensors

UNIT II
ACTUATION SYSTEMS
Pneumatic and Hydraulic Systems Directional Control Valves Rotary Actuators. Mechanical Actuation Systems – Cams – Gear Trains – Ratchet and pawl – Belt and Chain Drives – Bearings.Electrical Actuation Systems – Mechanical Switches – Solid State Switches – Solenoids – Constructionand working principle of DC and AC Motors,speed control of AC and DC drives, Stepper Motors-switching circuitries for stepper motor – AC & DCServo motors

UNIT III
SYSTEM MODELS AND CONTROLLERS
Building blocks of Mechanical, Electrical, Fluid and Thermal Systems, Rotational Transnational Systems,Electromechanical Systems Hydraulic Mechanical Systems. Continuous and discrete process Controllers – Control Mode – Two – Step mode – Proportional Mode – Derivative Mode – Integral Mode – PIDControllers – Digital Controllers – Velocity Control – Adaptive Control – Digital Logic Control – MicroProcessors Control.

UNIT IV
PROGRAMMING LOGIC CONTROLLERS
Programmable Logic Controllers– Basic Structure – Input / Output Processing – Programming –

Mnemonics Timers, Internal relays and counters Shift Registers Master and Jump Controls – DataHandling – Analogs Input / Output – Selection of a PLC.

UNIT V

DESIGN OF MECHATRONICS SYSTEM

Stages in designing Mechatronics Systems Traditional and Mechatronic Design Possibl e Design Solutions. Case studies of Mechatronics systems Pick and place Robot Autonomous mobile robot-Wireless suriviellance balloon- Engine Management system- Automatic car park barrier.

TEXT BOOKS:

1. Bolton,W, "Mechatronics" , Pearson education, second edition, fifth India n Reprint, 2003
2. Smaili.A and Mrad.F , "Mechatronics integrated technologies for i ntelligent machines", Oxforduniversity press, 2008

REFERENCES:

1. Rajput. R.K, A textbook of mechatronics, S. Chand & Co, 2007
2. Michael B. Histand and David G. Alciatore, "Introduction to Mechatroni cs and Measurement Systems", McGraw-Hill International Editions, 2000.
3. Bradley D. A., Dawson D., Buru N.C. and. Loader A.J, "Mechatronics", Chapm an and
4. Hall, 1993.
5. Dan Necsulesu, "Mechatronics", Pearson Education Asia, 2002 (Indian Reprint).
6. Lawrence J. Kamm, "Understanding Electro – Mechanical Engineering", An
7. Introduction to Mechatronics, Prentice – Hall of India Pvt., Ltd., 2000.
8. Nitaigour Premchand Mahadik, "Mechatronics", Tata McGraw- Hill publishing
9. Company Ltd, 2003

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B. Tech IV-II Sem. (EIE)

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15A10804 JAVA PROGRAMMING
(MOOCS-III)

Course Objective:

- *Study the syntax, semantics and features of Java Programming Language*
- *Learn the method of creating Multi-threaded programs and handle exceptions*
- *Learn Java features to create GUI applications & perform event handling*

Course Outcome:

- *Ability to solve problems using object oriented approach and implement them using Java*
- *Ability to write Efficient programs with multitasking ability and handle exceptions*
- *Create user friendly interface*

UNIT I

Introduction to Java: The key attributes of object oriented programming, Simple program, The Java keywords, Identifiers, Data types and operators, Program control statements, Arrays, Strings, String Handling

UNIT II

Classes: Classes, Objects, Methods, Parameters, Constructors, Garbage Collection, Access modifiers, Pass Objects and arguments, Method and Constructor Overloading, Understanding static, Nested and inner classes.

Inheritance – Basics, Member Access, Usage of Super, Multi level hierarchy, Method overriding, Abstract class, Final keyword.

Interfaces – Creating, Implementing, Using, Extending, and Nesting of interfaces.
Packages – Defining, Finding, Member Access, Importing.

UNIT III

Exception handling: Hierarchy, Fundamentals, Multiple catch clauses, Subclass exceptions, Nesting try blocks, Throwing an exception, Using Finally and Throws, Built-in exceptions, User-defined exceptions.
I/O: Byte streams and Classes, Character streams and Classes, Predefined streams, Using byte streams, Reading and Writing files using byte streams, Reading and writing binary data, Random-access files, File I/O using character streams, Wrappers.

UNIT IV

Multithreading: Fundamentals, Thread class, Runnable interface, Creating multiple threads, Life cycle of thread, Thread priorities, Synchronization, Thread communication, Suspending, Resuming and Stopping threads. **Applets**: Basics, skeleton, Initialization and termination, Repainting, Status window, Passing parameters.

Networking: Basics, Networking classes and interfaces, InetAddress, Inet4Address and Inet6Address, TCP/IP Client Sockets, URL, URLConnection, HttpURLConnection, The URI class, Cookies, TCP/IP Server sockets, Datagrams.

UNIT V

Swings: The origin and design philosophy of swing, Components and containers, Layout managers, Event handling, Using a push button, jtextfield, jlabel and image icon, The swing buttons, Trees, An overview of jmenubar, jmenu and jmenuitem, Creating a main menu, Add mnemonics and accelerators to Menu items, showmessagedialog, showconfirmdialog, showinputdialog, showoptiondialog, jdialog, Create a modeless dialog.

Text Books:

1. "Java Fundamentals - A Comprehensive Introduction", Herbert Schildt and Dale Skrien,
2. Special Indian Edition, McGrawHill, 2013.
3. "Java The Complete Reference" Herbert Schildt, 8th Edition, 2011, Oracle press, TataMcGraw-Hill

Reference Books:

1. "Programming with Java" T.V.Suresh Kumar, B.Eswara Reddy, P.Raghavan Pearson Edition.
2. "Java – How to Program", Paul Deitel, Harvey Deitel, PHI.
3. "Core Java", Nageswar Rao, Wiley Publishers.
4. "Thinking in Java", Bruce Eckel, Pearson Education.
5. "A Programmers Guide to Java SCJP", Third Edition, Mughal, Rasmussen, Pearson.
6. "Head First Java", Kathy Sierra, Bert Bates, O"Reilly
7. "SCJP – Sun Certified Programmer for Java Study guide" – Kathy Sierra, Bert Bates, McGrawHill
8. "Java in Nutshell", David Flanagan, O"Reilly
9. "Core Java : Volume I – Fundamentals, Cay S. Horstmann, Gary Cornell, The Sun Micro Systems Press.