Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Six Year Dual Degree (B.Tech.+M.Tech.)-Mechatronics

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTMA301		Applied Mathematics - 3	60	20	20	-	-	3	1	-	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objective
To introduce the students with the Fundamentals of the Calculus of the Complex Variable, Random Variable and Fourier Analysis.

Course Outcomes
After the successful completion of this course students will be able to

1. Understand and apply the basics of the Calculus of the Complex variables.
2. know the fundamentals of the Probability Theory and Random Process.
3. apply the concepts of the Fourier Analysis
4. know the techniques of the Fourier Transform.
5. find the solution of the PDE.

Syllabus

UNIT – I

Complex Analysis

Complex numbers , geometric representation, powers and roots of complex numbers. Functions of a complex variable: Limit, Continuity, Differentiability, Analytic functions, Cauchy-Riemann equations, Harmonic functions, Harmonic conjugates. Elementary Analytic functions(polynomials, exponential function, trigonometric functions), Complex integration, Cauchy's integral theorem, Cauchy's integral formula. Taylor series and Laurent series. Zeros,Singularities and its classifications, Residues, Residue theorem and its applications.

UNIT – II

Probability Theory and Random Process

Axiomatic construction of the theory of probability, independence, conditional probability, and basic formulae, random variables, binomial, poisson and normal random variable, probability distributions, functions of random variables; mathematical expectations, Definition and classification of random processes, discrete-time Markov chains, Poisson process, Correlation and Regression; Expectation and Variance

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UNIT – III

Fourier series

Fourier Integral, Fourier series of 2p periodic functions, Fourier series of odd and even functions, Half-range series, Convergence of Fourier series, Gibb's phenomenon, Differentiation and Integration of Fourier series, Complex form of Fourier series.

UNIT – IV

Fourier Transformation

Fourier Integral Theorem, Fourier Transforms, Properties of Fourier Transform, Convolution and its physical interpretation, Statement of Fubini's theorem, Convolution theorems, Inversion theorem

UNIT – V

Partial Differential Equations

Introduction to PDEs, basic concepts, Linear and non-linear first order PDE, Higher order linear homogeneous PDE, Separation of variable and its application to the one dimensional wave and heat equation.

Texts:

1. R. V. Churchill and J. W. Brown, Complex Variables and Applications, 5th Edition, McGraw-Hill, 1990.
2. K. Sankara Rao, Introduction to Partial Differential Equations, 2nd Edition, 2005.
3. G. R. Grimmett and D. R. Stirzaker, Probability and Random Processes, Oxford University Press, 2001.
4. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2000.
5. W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Edition, Wiley, 1968.
6. K. S. Trivedi, Probability and Statistics with Reliability, Queuing, and Computer Science Applications, Prentice Hall of India, 1998.
   A. Papoulis and S. Unnikrishna Pillai, Probabilities, Random Variables and Stochastic Processes, 4th Edition, Tata McGraw-Hill, 2002.
7. S.M. Ross, Stochastic Processes, 2nd Edition, Wiley, 1996.
8. J. Medhi, Stochastic Processes, New Age International, 1994.
9. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, Delhi

References:

1. J. H. Mathews and R. W. Howell, Complex Analysis for Mathematics and Engineering, 3rd Edition, Narosa, 1998.
2. I. N. Sneddon, Elements of Partial Differential Equations, McGraw-Hill, 1957.
3. E. Kreyszig, Advanced Engineering Mathematics, 5th / 8th Edition, Wiley Eastern / John Wiley, 1983/1999

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SUBJECT CODE	Category	SUBJECT NAME	TEACHING &EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTEI401		Microprocessor & Microcontroller	60	20	20	30	20	3	1	2	5

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):

1. To gain knowledge of basics of Microprocessor & microcontroller & Learn development of assembly language programs.
2. To learn the programming skills of 8086 microprocessor & 8051 microcontroller.
3. To learn the interfacing of external devices (LED, LCD, ADC, DAC) with the microcontroller 8051.

Course Outcomes (COs):

The students will be able to

1. Apply the concept of buses, microprocessor & microcontroller architecture and interrupts.
2. Interface memory and I/O devices with 8051 microcontroller
3. Program assembly language / C programming of 8051 & 8086.
4. Design microcontroller based small system
5. Interface 8051 with LED, LCD, ADC, DAC etc.

Syllabus

UNIT I **08hr.**

Introduction to 8086 Microprocessor

Overview of 8086 microprocessor. Architecture of 8086, Signals and pins of 8086 microprocessor, Concept of Memory Segmentation in 8086. Maximum Mode , Minimum Mode, Timing diagram, Comparative study of Salient features of 8086, 80286 & 80386.

UNIT II

10hr.

Microprocessor 8086 programming

8086 Instructions set . Addressing mode of 8086, Assembly directives. Stack , Interupts of 8086, Assembly language programs of 8086.

Input-Output interfacing: Peripherals I/O. PPI 8255 Architecture and modes of operation,

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Interfacing to 16-bit microprocessor and programming, DMA controller (8257) Architecture, Programmable interval timer 8254, USART 8251.

UNIT III **08hr.**

Introduction to 8051 Microcontroller

Introduction, Difference between Microprocessors and Microcontrollers. Overview of 8051 Microcontroller family, Architecture of 8051 Microcontroller, The program counter and ROM space in the 8051, registers, 8051 register banks

UNIT IV **10hr.**

8051 Assembly Language Programming

Introduction to 8051 assembly programming, Structure of Assembly language, Assembling and running an 8051 program, 8051 data types and directives, interrupts

8051 Addressing Modes & Instruction set

Addressing modes, Accessing memory using various Addressing modes, Bit addresses for I/O and RAM, Arithmetic instructions, Signed number concepts and arithmetic operations, Logic and compare instructions, Rotate instruction, Jump, Loop, And Call Instructions, Call instructions time delay for various 8051 chips.

UNIT V **10hr.**

8051 Programming in C

Data types and time delay in 8051 C, I/O programming in 8051 C, Logic operations in8051 C, Data conversion programs in 8051 C, Accessing code ROM space in 8051 C, Interfacing with LEDs, LCDs ADCs, DACs.

Text Books:

1.A.K. Ray & K.M.Bhurchandi, Advanced Microprocessors and peripheral-Architecture, Programmingand Interfacing, Tata McGraw –Hill, 2012(Third Edition)

2.The 8051 Microcontroller and Embedded Systems Using Assembly and C, 2/e by Muhammad Ali Mazidi, Janice Gillispie Mazidi and Rolin McKinlay,2008(SecondEdition,PearsonEducation)

3.The 8051 Microcontroller & Embedded Systems using Assembly and C By Kenneth J. Ayala, Dhananjay V. Gadre, 2008 (Cengage Learning , India Edition).

Reference Books:

1.Hall Douglas V.,Microprocessor and interfacing, Revised second edition 2006, Macmillan, McGraw Hill

2.Using the MCS-51 Microcontrollers By Han Way Huang Oxford Uni Press,2000

3. Programming and Customizing the 8051 Microcontroller by Myke Predko Tata McGraw Hill,1999

4. Microcontrollers Architecture, programming, interfacing and system design by Rajkamal Pearson education,2009

List of Experiment:

1. Introduction to 8086 & 8051 kit, hardware features & modes of operationand Technique of programming & basic commands of kit.

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2. Design programs for Arithmetic Operations.
3. Develop a program to find 1's complement and then 2's complement of a 16-bit numbers.
4. Develop a program to find larger of two numbers.
5. Write a program to shift an 8-bit number left by 2-bits.
6. Write a program to generate a square wave of 2 KHz Frequency on input pin.
7. Introduction to IDE and Assembler directives.
8. Develop 8051 Assembly language programs using Arithmetic/ Logical instructions.
9. 8051 Assembly language programming for block data transfer between internal and external memory including overlapping blocks.
10. 8051 Assembly language programming for
    a. code conversions
    b. Timers in different modes.
    c. I/O port programming in embedded C.
    d. Programming of LCD in embedded C.

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			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTMT 402		MEASUREMENT SCIENCE & TECHNIQUES	60	20	20	30	20	3	1	2	5

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):

1. To introduce the basic functional elements of measurement
2. To introduce different types of Ammeter & Voltmeter
3. To educate on different types of signal generator.
4. To introduce various storage and display devices
5. To introduce various Environmental Pollution Monitoring Instruments

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes

The students will be able to

1. To apply knowledge of measurement system.
2. To identify, formulate, and solve the different types of Ammeter & Voltmeter
3. Demonstrate various types of of signal generator instrument.
4. Demonstrate various types of environmental pollution monitoring instruments.

Syllabus

Unit-I

Measurement and error, Accuracy and precision, sensitivity resolution, Error & Error analysis, Effect of temperature, Internal friction, Stray field, Hysterisis and Frequency variation & method of minimizing them, Loading effects, due to shunt connected and series connected instruments, calibration curve, Testing & calibration of instruments

Unit-II

Different types of Ammeter & Voltmeter – PMMC, MI, Electrodynamometer, Hotwire, Electrostatic, Induction, Rectifier, Ferro dynamic & Electro-thermic, Expression for control &

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deflection torque, their advantages, disadvantages & error, Extension of range of instruments using shunt & multiplier.

Unit-III

Miscellaneous Instruments & Measurements:. Frequency meter – Vibrating reed, Resonance type & Weston type, Synchronoscope, Ohmmeter – series & stunt type, Multi-meter, Megger & Ratio meter. Signal generator: Function generator, sweep frequency generator, Pulse and square wave generator, Wave Analysers, Harmonic Distortion Analyser, Spectrum Analyser, frequency counter.

Unit-IV

R, L, C Measurement: Bridges: Measurement of resistance using Wheatstone bridge, Kelvin's double bridge, Loss of charge method, ohm meter, Measurement of inductance and capacitance by A.C. bridges: Maxwell's bridge, Anderson bridge, Schering bridge, Hay's bridge, Wein's bridge, Shielding and grounding, Q meter.

Unit-V

Gas Analysis: Gas chromatography, Thermal conductivity method, Heat of reaction method Zirconia-probe oxygen analyser. Paramagnetic oxygen meters, Electrochemical reaction method. Environmental Pollution Monitoring Instruments : Air pollution monitoring instruments, Water pollution monitoring instruments.

Text Books:

1. A.K. Sawhney; Electrical & Electronic Measurements & Instrument; Dhanpat Rai & Sons Pub.

References:

1. Electronic Instrumentation – Kalsi – TMH
2. Patranabis D-Principles of Industrial Inst. TMH Publication

List of Experiments:

1. Study of CRO and perform component testinng using CRO.
2. Study of phase & frequency using Lissajous pattern with help of CRO.
3. Nakra and Chaudhry "Instrumentation measurement and analysis *& Co.*
4. Measurement of high resistance by loss of charge method
5. Study of function generator with its application.
6. To study and find out the balance condition for the Maxwell's bridge.
7. To study and find out the balance condition for the Schering bridge.
8. To study and find out the balance condition for the Hay's Bridge.
9. To study and find out the balance condition for the Wein's bridge.
10. To study and find out the balance condition for the Anderson's Bridge.

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B. Tech. in Mechanical Engineering

Year 2nd **Sem 4th**

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM UNIVERSITY EXAM	TWO TERM EXAM	TEACHER ASSESSTMENT*	END SEM UNIVERSITY EXAM	TEACHER ASSESSTMENT*				
BTME401	DCS	FLUID MECHANICS	60	20	20	30	20	3	1	2	5

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; C - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 20 marks.

Course Educational Objectives (CEOs):

To introduction with (A) Fluid and its properties, (B) behavior of fluid under various conditions, (C) Applications.

Course Outcomes (COs):

After the successful completion of this course students will be able to

1. Correlate fundamentals of fluid mechanics with various mechanical systems.
2. Understand basics of compressible flow.
3. Understand fundamentals of flow through pipes.
4. Understand statics, dynamics and various approaches to fluid mechanics.

Syllabus

Unit - I

Flow and Fluid Properties: Viscosity, relationship between stress and strain-rate for Newtonian fluids, incompressible and compressible flows, differences between laminar and turbulent flows. Hydrostatics forces: Buoyancy and floatation, manometer, forces on submerged and floating bodies, stability conditions.

Unit - II

Kinematics: Types of fluid flow, rate of flow or discharge continuity equation, velocity and acceleration, velocity potential function and stream function, types of motion, vortex flow.
Ideal flow: Uniform flow, source flow, sink flow, free vortex flow.

Unit - III

Differential Analysis: Differential equations of mass and momentum for incompressible flows, inviscid - Euler equation and viscous flows - Navier-Stokes equations, Bernoulli's equation from

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Year 2nd **Sem 4th**

Euler's equation and assumptions, concept of fluid rotation, vorticity, stream function, Exact solutions of Navier-Stokes equation for Coquette Flow and Poiseuille flow, Orifices and mouthpieces: classifications of and flow through orifice, hydraulic coefficients, experimental determination of hydraulic coefficients, classification and flow through convergent and divergent mouthpiece.

Unit - IV

Dimensional Analysis: Introduction, secondary or derived quantities, methods of dimensional analysis, model analysis, similitudes-types of similarities, dimensionless numbers, models law and Concept of geometric, kinematic and dynamic similarity, some common non-dimensional parameters and their physical significance: Reynolds number, Froude number and Mach number. **Internal Flows:** Fully developed pipe flow, various losses in pipe flow, and empirical relations for laminar and turbulent flows: friction factor and Darcy-Weisbach relation.

Unit-V

Prandtl Boundary Layer Equations: Concept and assumptions, qualitative idea of boundary layer and separation, streamlined and bluff bodies, drag and lift forces. Flow measurements: Basic ideas of flow measurement using venturimeter, Pitot - static tube and orifice plate.

Reference Books:

1. *"Fluid Mechanics and Fluid Power Engineering", by D.S. Kumar, S.K. Kataria & Sons*
2. *"Fluid Mechanics and Hydraulic Machines", by R.K. Bansal, Laxmi Publications*
3. *"Fluid Mechanics and Hydraulic Machines", by R.K. Rajput, S. Chand & Co.*
4. *"Fluid Mechanics", by Frank. M. White, McGraw Hill Publishing Company Ltd.*
5. *"Fundamentals of Fluid Mechanics", by Munson, Wiley India Pvt. Ltd*
6. *"Fluid Mechanics by A. K. Mohanty", PHI Learning Pvt. Ltd.*
7. *" Laboratory Manual Hydraulics and Hydraulic Machines", by R V Raikar*

List of Experiments

1. To understand pressure measurement procedure and related instruments/devices.
2. To study metacentric height of floating body.
3. Verification of Bernoulli's theorem.
4. To study the velocity of flow using Pitot tube.
5. To determine the Coefficient of discharge through different flow meters. (Any two out of Orifice meter, Venturi meter and Nozzle meter.)
6. To determine the different types of flow Patterns by Reynolds's experiment.
7. To study the Friction factor for the different pipes.
8. To study the loss coefficients for different pipe fittings.

14/9/17

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SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM UNIVERSITY EXAM	TWO TERM EXAM	TEACHER ASSESSMENT*	END SEM UNIVERSITY EXAM	TEACHER ASSESSMENT*				
BTME 503	DCS	DYNAMICS OF MACHINE	60	20	20	30	20	3	1	2	5

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; C - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 20 marks.

Course Educational Objectives (CEOs):

To introduce basic principles and applications of (A) Engine Mechanisms (B) Governor Mechanisms (C) Balancing of Inertia Forces, Friction and Brakes

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes

1. Student would be able to understand the need of Mechanisms in engine parts.
2. Students would be able to understand basics of Displacement, velocity and acceleration of piston.
3. Students would be able to understand Governor Mechanisms.
4. Students would be able to understand the basics of Balancing of masses.
5. Students would be able to understand utility of Friction in Machine parts.
6. Students would be able to analyze Cam movement.

Syllabus

Unit - I

Dynamics of Engine Mechanisms: Displacement, velocity and acceleration of piston, turning moment on crankshaft, turning moment diagram, Fluctuation of crankshaft speed, Analysis of flywheel.

Unit - II

Governor Mechanisms: Types of governors, characteristics of centrifugal governors, gravity and spring controlled centrifugal governors, hunting of centrifugal governors, inertia governors.

Unit - III

Balancing of Inertia Forces: Balancing of rotating masses, Two plane balancing, Determination of balancing masses (graphical and analytical methods), Balancing of rotors, Balancing of

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internal combustion engines, Single cylinder engines, In-line engines, V-twin engines, Radial engines, Lanchester technique of engine balancing.

Unit - IV

Friction: Frictional torque in pivots and collars by uniform pressure and uniform wear rate criteria, Boundary and fluid film lubrication, friction in journal and thrust bearings, concept of friction circle and axis, rolling friction.

Unit-V

Belt drives: Velocity ratio, limiting ratio of tension; power transmitted; centrifugal effect on belts, maximum power transmitted by belt, initial tension, creep; chain and rope drives.
Brakes: Band brake, Band and block brakes, Internal and external shoe brakes.
Dynamometer: Different types and their applications.
Dynamic Analysis of Cams: Response of un-damped cam mechanism (analytical method), follower response analysis by phase-plane method, jump and cross-over shock.

Reference Books:

1. *"Theory of machines", by Rattan; Publisher: TMH, 2009.*
2. *"Mechanism and Machine Theory", by Ambekar; Publisher: PHI, 2007.*
3. *"Theory of Machines", by Thomas Bevan; Publisher: Pearson, 2010.*
4. *"Theory of Mechanisms and Machines", by Ghosh and Malik; Publisher: East-West Press, 2015.*
5. *"Kinematics and dynamics of machinery", by Norton RL; Publisher: TMH, 2009.*
6. *"Theory of Machines", by P.L. Balaney; Publisher: Khanna, 2003.*

List of Experiments

1. To Perform Experiment on Watt and Porter Governors & also Prepare Performance Characteristic Curves in order to find Stability & Sensitivity.
2. To Perform Experiment on Proell Governor & also Prepare Performance Characteristic Curves in order to find Stability & Sensitivity.
3. To Perform Experiment on Hartnell Governor & also Prepare Performance Characteristic Curves in order to find Stability & Sensitivity.
4. To determine gyroscopic couple on Motorized Gyroscope.
5. To study gyroscopic effects through models.
6. To study Dynamically Equivalent System.
7. To study different types of dynamometers.
8. To study different types of clutch.
9. To study different types of Brakes.

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			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTEI403		PCB Designing Lab-II	0	0	0	30	20	0	0	2	1

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEO's): -

1. To be familiar with PCB design and to develop and improve the PCB from design phase.
2. To provide in depth knowledge of PCB fabrication.
3. To provide the knowledge in assembling of the PCB based electronic circuits continues through material selection, testing and implementation.

Course Outcomes (CO's):-

Students will be able to:

1. Apply basic electronics component knowledge along with the functional understanding of electronic circuits so as to design and conduct experiments.
2. Identify, formulate, and solve engineering problems related to PCB design.
3. Design and simulate various PCB circuits using industry standard PCB design software tools like Eagle, Orcad, Power PCB and TINA packages.
4. Identify, formulate, and solve engineering problems associated with assembly and testing of electronic circuits and also understand the process of PCB manufacturing
5. Design and simulate various electronic PCB's required for prototyping and testing using software tools and testing equipments.
6. Know the concept of EMI/EMC and take precautionary steps in the design of PCB's.

List of Experiments:

1. Familiarization/Identification of all electronic components with their specifications (Functionality, type, size, package, symbol, cost etc).

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2. Introduction to PCB design software (OrCAD schematic capture tool) and Industry standard PCB design software tools like Eagle, Power PCB and TINA packages.
3. To simulate simple electronic circuit, Schematic to layout transfer, Layout Printing.
4. Etching the PCB, Cleaning, drying, drilling holes, identification of components and its location on the PCB, soldering the components on PCB and testing the assembled circuit for correct functionality.
5. To check and verify connection of electronic components using conductive pathways, tracks or signal traces etched from copper sheets.
6. To understand various PCB techniques - Soldering techniques, drill-size, minimum track-width, minimum track-to-track and track-to-pad distance, tolerances, etc.
7. To understand and implement PCB assembly and PCB design control techniques – Routing, Partitioning, Board stack-up, Board level shields, Use of isolating lines.
8. Case study on Single and double sided plated through hole (PTH) and multi-layered PCBs.
9. To study High-density interconnect (HDI) and flexible PCBs, used in liquid crystal displays (LCDs) and touch screens.
10. Develop one mini project using all above process.

Text Books:

1. Electronic Devices, Thomas L. Floyd, Pearson (9th Edition), 9-Jan-2011.
2. Electronic Devices and Circuits, David A. Bell, Oxford Press (5th Edition) 30- April-2008.

References:

1 Printed Circuit Boards: Design, Fabrication, Assembly and Testing R.S. Khandpur Tata McGraw-Hill Education, 24-Feb-2005.
2 The PCB Design Magazine – an iConnect007 publication.
3 PCB Design, Device Handling and Assembly Guidelines AN-001 mCube Inc.
4 Printed Circuits Handbook Clyde Coombs McGraw Hill Professional, 22-May-2007.

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SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTEI404	Electronics	PLC Lab	0	0	0	0	50	0	0	2	1

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;
Q/A – Quiz/Assignment/Attendance, MST Mid Sem Test.

Course Objectives: -

1. To be familiar with PLC and design processes involved.
2. To provide in depth knowledge of PLC programming.
3. To learn the testing of the PLC based programs.

Course Outcomes:-

Students will be able to:

1. Apply the knowledge of engineering to design and conduct experiments using PLC software.
2. Identify, formulate, and solve engineering problems related hydraulic and pneumatic.
3. Design and simulate various PLC programs and implement it on a process.
4. Identify, formulate, and solve engineering problems associated with PLC design software.

List of Experiments:

1. To understand PLC and its types with their applications.
2. To introduce ladder logic, its hardware and software terminology.
3. To implement the basic logic gates using universal logic gates through PLC.
4. To analyze Boolean logic expression and program it through PLC.
5. Implement half adder, full adder, and subtractors.
6. Design multiplexers and Demultiplexer through PLC ladder logic.
7. Design Encoder and Decoder through PLC.
8. To implement and design timer and counter logic functions using PLC.
9. To analyze various pneumatic control valve and design its ladder logic.
10. Design and program ladder logic for traffic controller.

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Text Books:

1. Madhuchhanda Mitra and Samarjit Sen Gupta, "Programmable Logic Controllers (PLC) and Industrial Automation", Penram International Publishing (India) Pvt. Ltd. 2007.

References:

1. Gary Dunning, 'Introduction to Programmable logic Controllers',(Delmar Publisher),19 July 2011.
2. Webb & Reis, Programmable logic Controllers: Principles and Applications',(Prentice Hall of India), fifth edition, 25 march 2002

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