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Shri Vaishnav Institute of Technology and Science
Choice Based Credit System (CBCS) in the Light of NEP-2020
B.Tech. in Electronics and Instrumentation
(Common to EI/MX/EE/EX/RW)
(2021-2025)

COURSE CODE	CATE-GORY	COURSE NAME	TEACHING &EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTEI401	DCC	Microprocessor and 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 **8Hrs.**

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 **10Hrs.**

Microprocessor 8086 programming

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

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Input-Output interfacing: Peripherals I/O. PPI 8255 Architecture and modes of operation, Interfacing to 16-bit microprocessor and programming, DMA controller (8257) Architecture, Programmable interval timer 8254, USART 8251.

UNIT III **8 Hrs.**

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 **10Hrs.**

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 **10 Hrs.**

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.

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Text Books:

1. 1.A.K. Ray & K.M. Bhurchandi, "Advanced Microprocessors and peripheral-Architecture, Programming and Interfacing", Tata McGraw –Hill, 2012.
2. Muhammad Ali Mazidi, Janice Gillispie Mazidi and Rolin McKinlay, "The 8051 Microcontroller and Embedded Systems Using Assembly and C, 2/e", Second Edition, Pearson Education 2008.
3. Kenneth J. Ayala, Dhananjay V. Gadre ,"The 8051 Microcontroller & Embedded Systems using Assembly and C",Cengage Learning , India Edition, 2008.

References:

1. Douglas V. Hall ,"Microprocessor and interfacing", Revised second edition, Macmillan, McGraw Hill 2006.
2. Han Way Huang,"Using the MCS-51 Microcontrollers" , Oxford Uni Press,2000.
3. Rajkamal ,"Microcontrollers Architecture, programming, interfacing and system design" Pearson education,2009.

List of Experiments:

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

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BTEI401	**DCC**	**Microprocessor and Microcontroller**	60	20	20	30	20	3	1	2	**5**

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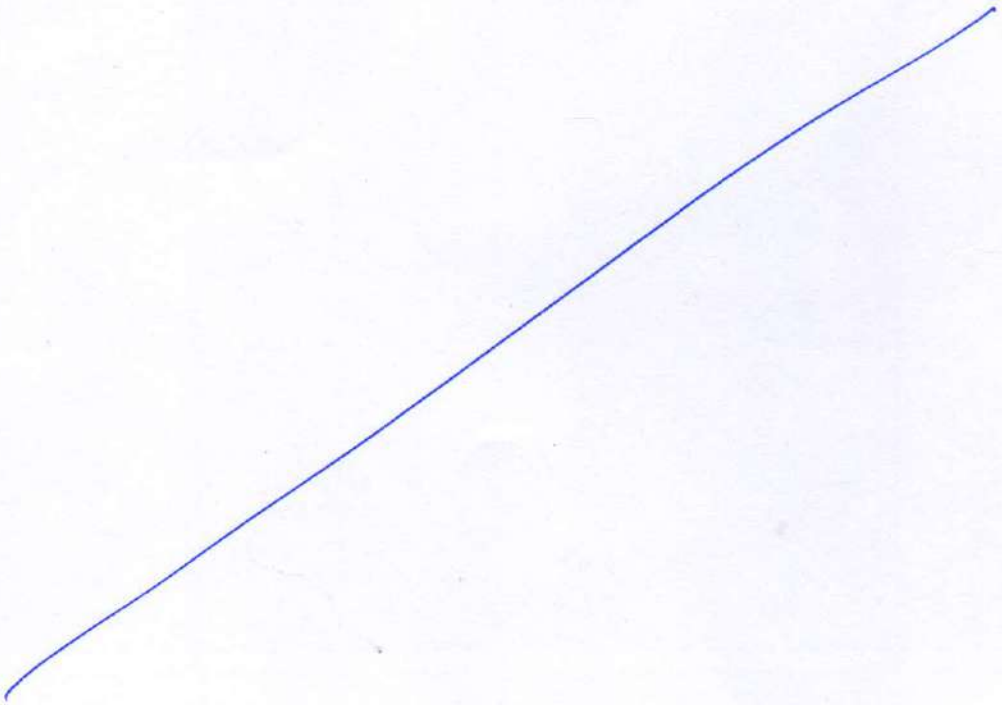
10. 8051 Assembly language programming for
    a. code conversions
    b. Timers in different modes.
    c. I/O port programming in embedded C.
    d. Programming of LCD in embedded C.



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ML307 ENVIRONMENTAL MANAGEMENT AND SUSTAINABILITY

SUBJECT CODE	CATEGORY	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
ML-307	Compulsory	Environmental Management and Sustainability	60	20	20	0	0	4	0	0	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher's Assessment** shall be based upon following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objective

1. To create awareness towards various environmental problems.
2. To create awareness among students towards issues of sustainable development.
3. To expose students towards environment friendly practices of organizations.
4. To sensitize students to act responsibly towards environment.

Examination Scheme

The internal assessment of the students' performance will be done out of 40 Marks. The semester Examination will be worth 60 Marks. The question paper and semester exam will consist of two sections A and B. Section A will carry 36 Marks and consist of five questions, out of which student will be required to attempt any three questions. Section B will comprise of one or more cases / problems worth 24 marks.

Course Outcomes

1. The course will give students an overview of various environmental concerns and practical challenges in environmental management and sustainability.
2. Emphasis is given to make students practice environment friendly behavior in day-to-day activities.

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COURSE CONTENT

Unit I: Introduction to Environment Pollution and Control

1. Pollution and its types (Air, Water, and Soil): Causes, Effects and Control measures
2. Municipal Solid Waste: Definition, Composition, Effects
3. Electronic Waste: Definition, Composition, Effects
4. Plastic Pollution: Causes, Effects and Control Measures

Unit II: Climate Change and Environmental Challenges

1. Global Warming and Green House Effect
2. Depletion of the Ozone Layer
3. Acid Rain
4. Nuclear Hazards

Unit III: Environmental Management and Sustainable Development

1. Environmental Management and Sustainable Development: An overview
2. Sustainable Development Goals (17 SDGs)
3. Significance of Sustainable Development
4. Environment Friendly Practices At Workplace and Home (Three Rs' of Waste Management, Water Conservation, Energy Conservation)

Unit 1V: Environmental Acts

1. The Water (Prevention and Control of Pollution) Act, 1974: Objectives, Definition of Pollution under this act, Powers and Functions of Boards
2. The Air (Prevention and Control of Pollution) Act, 1981:Objectives, Definition of Pollution under this act, Powers and Functions of Boards
3. The Environment (Protection) Act, 1986: Objectives, Definition of important terms used in this Act, Details about the act.
4. Environmental Impact Assessment: Concept and Benefits

Unit V:Role of Individuals, Corporate and Society

1. Environmental Values
2. Positive and Adverse Impact of Technological Developments on Society and Environment
3. Role of an individual/ Corporate/ Society in environmental conservation
4. Case Studies: The Bhopal Gas Tragedy, New Delhi's Air Pollution, Arsenic Pollution in Ground Water (West Bengal), Narmada Valley Project, Cauvery Water Dispute,Fukushima Daiichi Disaster (Japan), Ozone Hole over Antarctica, Ganga Pollution, Deterioration of Taj Mahal, Uttarakhand flash floods

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Suggested Readings:

1. Rogers, P.P., Jalal, K.F. , Boyd, J.A.(Latest Edition) . **An Introduction to Sustainable Development.** Earthscan
2. Kalam, A.P.J. (Latest Edition) . ***Target 3 Billon: Innovative Solutions Towards Sustainable Development.*** Penguin Books
3. Kaushik , A. and Kaushik (Latest Edition).***Perspectives in Environmental Studies***. New Delhi: New Age International Publishers.
4. Dhameja, S.K. (Latest Edition). ***Environmental Studies***. S.K. Kataria and Sons.New Delhi
5. Bharucha,E. (Latest Edition). ***Environmental Studies for Undergraduate Courses.*** New Delhi: University Grants Commission.
6. Wright, R. T. (Latest Edition). ***Environmental Science: towards a sustainable future*** .New Delhi: PHL Learning Private Ltd.
7. Rajagopalan, R. (Latest Edition). ***Environmental Studies***. New York: Oxford University Press.

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BTEC301	DCC	Advanced Programming Concepts	60	20	20	30	20	3	0	4	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):

The objective of this course is to-

1. Understand principles of object-oriented programming paradigm including abstraction, encapsulation, inheritance, and polymorphism.
2. Understand Java as a dynamic programming language.
3. Solve computing problems using advanced programming techniques.
4. Apply various system libraries for problem solving.

Course Outcomes (COs):

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

1. Explain the object-oriented concepts.
2. Write programs using object-based programming techniques including classes, objects and inheritance.
3. Demonstrate understanding of Java by implementing test cases.
4. Create, debug, and run Java programs using the Java SDK environment.

Syllabus

UNIT I **9 Hrs.**

Introduction

Review of Object-oriented concepts, Features of Java, Java Environment setup, JVM, JRE and JDK, Java Classes and Objects, Basic syntax, Basic Data Types, Variable Types, Basic Operators, Loop Control, Decision Making, Arrays.

UNIT II **9 Hrs.**

Java Fundamentals

Constructors, Methods and Variables, Method Overloading, Use of this and static keyword in Java, Static and Instance Initializer Blocks, Inner and Nested classes, Wrapper Classes, Autoboxing and Unboxing, Enumerations, Garbage collection.

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UNIT III

Inheritance and Polymorphism **9 Hrs.**

Understanding Inheritance, Types of Inheritance, Use of super keyword in Java, Polymorphism, Types of polymorphism, Method Overloading, Constructor Overloading, Method Overriding, Access Specifier, Packages, Interfaces, Abstract classes.

UNIT IV

Exception Handling and Multithreading **9 Hrs.**

Exceptions and errors, Exception hierarchy: Checked Unchecked exceptions, Types of Exception, Exception Handling using try, catch, finally, throw, throws, User Defined Exceptions.
Understanding Threads, Need of Multi-Threaded Programming, Thread Life cycle, Priorities and scheduling, Thread Synchronization, Inter Communication of Threads, Deadlock.

UNIT V

Java Library **8 Hrs.**

Java String class, String Buffer, String Builder, String Handling. Exploring java.lang, Object class. Exploring java.util package. Exploring java.io package.

Text Books:

1. Herbert Schildt, "Java: The Complete Reference", 11th Edition, McGraw-Hill Education, 2018.
2. E Balagurusamy, "Programming with Java: A Primer", 6th Edition, McGraw Hill Education, 2019.

References:

1. T. Budd, "Understanding Object-Oriented Programming with Java", Pearson Education, 2nd Edition, 2002.
2. J. Nino, F. A. Hosch, "An Introduction to programming and Object-Oriented design using Java", John Wiley & Sons, 3rd Edition 2002.
3. Y. Daniel Liang, " Introduction to Java programming", Pearson Education, India, 7th Edition, 2010.
4. Cay Horetmann, Gary Cornelll, "Core Java 2", Volume II-Advanced Feature", 7th Edition, Pearson Education, 2013

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List of Experiments:

1. Write a program to show concept of Class in Java.
2. Write a program to show Scope of Variables.
3. Write a program showing Type Casting.
4. Write a program to demonstrate use of different types of constructors
5. Write a program for inheritance.
6. Write a program in java to demonstrate access modifiers in java.
7. Write a program showing different types of Polymorphism.
8. Write a program for Exception Handling in Java.
9. Write a Multithreaded program in Java.
10. Write a program for string handling using different methods.

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BTMT501	DCC	Applied Hydraulics and Pneumatics	60	20	20	30	20	3	0	2	4

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Course Educational Objectives (CEOs):
1.To impart knowledge about Applied Hydraulics & Pneumatics.

Course Outcomes (COs):
Upon completion of the course, students will be able:
1.To know the advantages and applications of Fluid Power Engineering and Power Transmission System.
2.To learn the Applications of Fluid Power System in automation of Machine Tools and others Equipments.

Syllabus

UNIT II **12 Hrs.**
Introduction to fluid power, Advantages of fluid power, Application of fluid power system. Types of fluid power systems, Properties of hydraulic fluids, General types of fluids, Fluid power symbols. Basics of Hydraulics: Applications of Pascal's Law- Laminar and Turbulent flow, Reynolds's number, Darcy's equation, Losses in pipe, valves and fittings.

UNIT II **12 Hrs.**
Sources of Hydraulic Power: Pumping theory, Pump classification, Gear pump, Vane Pump, piston pump, construction and working of pumps, pump performance, Variable displacement pumps. Fluid Power Actuators: Linear hydraulic actuators, Types of hydraulic cylinders, Single acting, Double acting special cylinders like tanden, Rodless, Telescopic, Cushioning mechanism, Construction of double acting cylinder, Rotary actuators – Fluid motors, Gear, Vane and Piston motors.

UNIT III **10 Hrs.**
Construction of Control Components: Directional control valve ,3/2-way valve, 4/2-way valve, Shuttle valve, check valve, pressure control valve, pressure reducing valve, sequence valve, Flow control valve, Fixed and adjustable, electrical control solenoid valves, Relays, ladder diagram. Accumulators and Intensifiers: Types of accumulators, Accumulators circuits, sizing of accumulators, intensifier, Applications of Intensifier ,Intensifier circuit.

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UNIT IV **10Hrs.**

Pneumatic Components: Properties of air, Compressors, Filter, Regulator, Lubricator Unit, Air control valves, Quick exhaust valves, pneumatic actuators. Fluid Power Circuit Design, Speed control circuits, synchronizing circuit, Pneumatic hydraulic circuit, Sequential circuit design for simple applications using cascade method.

UNIT V **12Hrs.**

Servo systems – Hydro Mechanical servo systems, Electrohydraulic servo systems and proportional valves. Fluidics – Introduction to fluidic devices, simple circuits, Introduction to Electrohydraulic Pneumatic logic circuits, ladder diagrams, PLC applications in fluid power control. Fluid power circuits; failure and troubleshooting.

Text Books:

1. Anthony Esposito, "Fluid Power with Applications", Pearson Education 2005.
2. Majumdar S.R., "Oil Hydraulics Systems- Principles and Maintenance", Tata McGraw-Hill, 2001.

References:

1. Srinivasan.R, "Hydraulic and Pneumatic controls", Vijay Nicole, 2006.
2. Shanmugasundaram. K, "Hydraulic and Pneumatic controls", Chand & Co, 2006.
3. Majumdar S.R., "Pneumatic systems – Principles and maintenance", Tata McGraw Hill, 1995
4. Anthony Lal, "Oil hydraulics in the service of industry", Allied publishers, 1982.
5. Harry L. Stevart D.B, "Practical guide to fluid power", Taraoeala sons and Port Ltd. Broadey, 1976.
6. Michael J, Prinches and Ashby J. G, "Power Hydraulics", Prentice Hall, 1989.
7. Dudelyt, A. Pease and John T. Pippenger, "Basic Fluid Power", Prentice Hall, 1987.

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			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTMT501	**DCC**	**Applied Hydraulics and Pneumatics**	60	20	20	30	20	3	0	2	**4**

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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List of Experiments:

1. Design and testing of Pressure Control Hydraulic Circuit.
2. Design and testing of Flow Control Hydraulic Circuit.
3. Implementation and testing of Directional Control Hydraulic Circuit.
4. Implementation and testing of Pressure Control pneumatic Circuit.
5. Design and testing of Flow Control pneumatic Circuit.
6. Development and analysis of Directional Control pneumatic Circuit.
7. Development and analysis of circuits with Logic Control.
8. Implementation and testing of Circuits with Timers.
9. Design of circuits with programmed Logic sequence using an optional PLC in electrohydraulic trainer.
10. Demonstration of P/I and I/P

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COURSE CODE	CATE-GORY	COURSE NAME	TEACHING &EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTEI503	**SEC**	**Virtual LAB**	0	0	0	30	20	0	0	2	1

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***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 familiarize the student with introducing and exploring LABVIEW software.
2. To enable the student on how to approach for solving engineering problems using simulation tools.
3. To provide a foundation in use of this software for real time applications.

Course Outcomes (COs):

The students will be able to

1. Express programming & simulation for engineering problems.
2. Use virtual instruments on Labview Environment.

List Of Experiments:

1. To study about Labview.
2. Demonstration of Virtual Instruments.
3. Perform basic arithmetic and Boolean operations using Labview.
4. Find the sum of 'n' numbers using FOR loop and while loop and compare them.
5. Find the maximum and minimum variable from an array.
6. Merging of Analog signal at Labview.
7. Design calculator a using Labview.
8. Design a cube using Labview and analyze the graphical changes by changing the values in array.
9. Demonstration of simulink in Labview.
10. Design a minor project.

Text Books:

1. Dr. S. Sumathi,; Prof. P. Surekha ,"LabVIEW based Advance Instrumentation" , Springer; 1st edition 2007 .
2. Dr. S. Sumathi, Surekha P, "Virtual Instrumentation using LABView", ACME Learning, India, ISBN: 1234567175093, 01.12.2010, March 2011. , ISBN-13.

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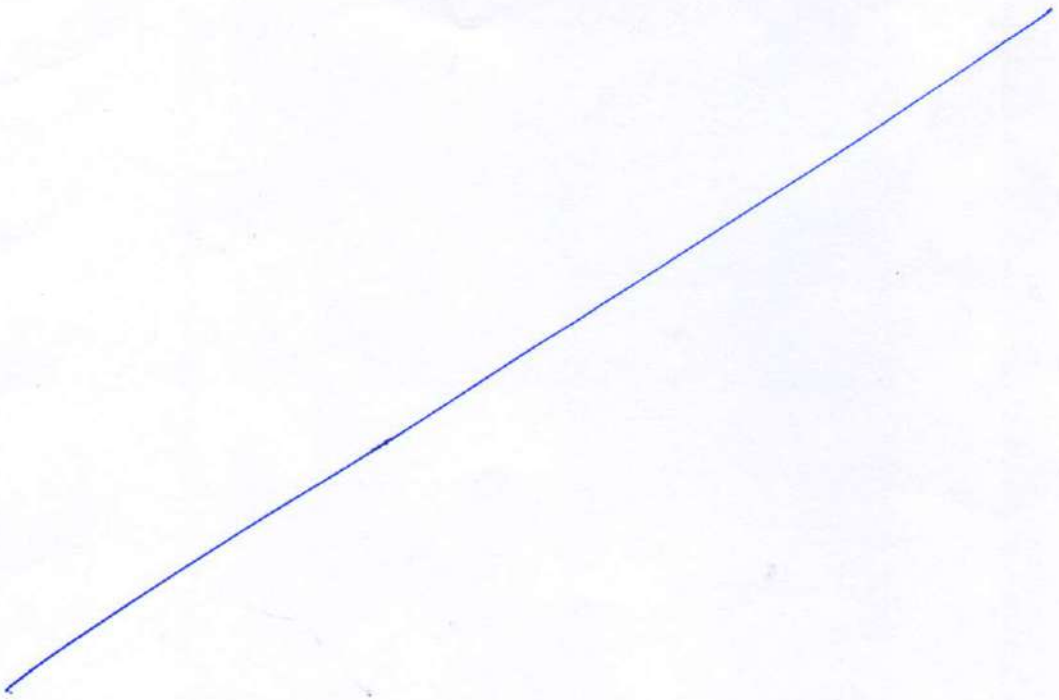
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTEI503	**SEC**	**Virtual LAB**	0	0	0	30	20	0	0	2	1

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.

References:

1. Gary Johnson, "Lab view graphical programming", II Ed., McGraw Hill, 2006.
2. Lisa K Wells & Jeffrey Travels, "Lab view for everyone", Prentice Hall, 1997.



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			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTEI404	SEC	PLC LAB	0	0	0	30	20	0	0	2	1

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Course educational objectives(CEOs)

1. To provide knowledge levels needed for PLC programming and operating.
2. To make the students how devices to which PLC input and output modules are Connected.
3. To train the students to create ladder diagrams from process control descriptions.
4. To make the students understand various types of PLC registers.
5. Apply PLC Timers and Counters for the control of industrial processes.
6. To make the students understand PLC functions, Data Handling Function.
7. To train the students to develop a coil and contactl control system to operate a basic robot and analog PLC operations.

Course outcomes(Cos)

At the end of the course student will have ability to

1. Ability to gain knowledge on Programmable Logic Controllers.
2. Will understand different types of Devices to which PLC input and output modules are Connected.
3. To provide the knowledge about understand various types of PLC registers.
4. Able to create ladder diagrams from process control descriptions.
5. Ability to apply PLC timers and counters for the control of industrial processes.
6. Able to use different types PLC functions, Data Handling Function.

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			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTEI404	SEC	PLC LAB	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.

List of Experiments:

1. Introduction of mechatronics and study of elements of mechatronics systems.
2. To study and analysis of Mechatronics products and systems in manufacturing.
3. To simulate the PLC Ladder logics through Siemens PLC kit and Step-7 Micro/ Win
   1. software.
4. To perform and verify given Boolean expressions using ladder logic on PLC simulation software kit.
5. To perform and verify half adder and full adder using ladder logic on PLC simulation software kit.
6. To perform and verify half subtractor and full subtractor using ladder logic on PLC simulation software kit.
7. Design ladder logic for MUX (4x1) on PLC simulation software kit.
8. Design a ladder logic for DEMUX (1x4) on PLC simulation software kit.
9. Design ladder logic for Encoder on PLC simulation software kit.
10. Design ladder logic for Decoder on PLC simulation software kit.

Text Books:

1. Curtis E. Johnson," Process Control Instrumentation Technology", Prentice hall of India, 8th Edition 2005.
2. W.Bolton ," Programmable Logic Controllers", Newness, sixth edition,2015.

References:

1. Garry Dunning ,"Introduction to Programmable Logic Controllers ",third edition, Thomson, 2005.
2. A.E. Fitzerald ,C.Kingsley and S.D Umans, "Electric Machinery", -McGraw Hill Int. sixth Edition, 2017.

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