# Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

## Diploma in (Electronics and Instrumentation)

| 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* | | | | |
| DTMA301 | | Applied Mathematics-3 | 60 | 20 | 20 | 0 | 0 | 3 | 1 | 0 | 4 |

**Legends**: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based on 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 Engineering Mathematics.

**Course Outcomes**

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

1. Apply the techniques of the modern algebra.
2. Understand the Quadratic Equations & Binomial Theorem.
3. Know the fundamental principles of the vector algebra.
4. Study the trigonometric properties used in the engineering.
5. Understand the concepts of the coordinate geometry.

**Syllabus**

**Unit 1**

**ALGEBRA:** Logarithm, Definition of natural and common Logarithm, Laws of Logarithm. Simple Problems. Complex Numbers: Definition of Complex numbers, Cartesian and polar. Exponential forms of complex numbers. Modulus, amplitude & conjugate of a complex number, Algebra of Complex numbers (Equality, Addition, Subtraction, Multiplication). Cube roots of unity & its properties. De Moivre's theorem (statement only) and simple problems.

**Unit 2**

**Quadratic Equations & Binomial Theorem:** Definition of Quadratic Equations, Analysing the nature of roots using discriminant, Relation between roots & coefficients, Conjugate roots, Binomial Theorem: Definition of factorial notation, definition of permutation and combination

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with formula, Binomial theorem for positive index (statement only), General term and middle term. Binomial theorem for negative index (statement only), Partial Fraction: Definition of polynomial fraction, proper & improper fractions and definition of partial fractions, Resolving proper fractions into partial fractions with denominator containing non repeated linear factors, repeated linear factors and irreducible non repeated quadratic factors.

**Unit 3**

**Vector Algebra:** Definition of a vector quantity. Concept of Position vector and Ratio formula. Rectangular resolution of a vector. Algebra of vectors – equality, addition, subtraction & scalar multiplication. Scalar (Dot) product of two vectors with properties. Vector (cross) product of two vectors with properties. Applications: Application of dot product in work done by a force and projection of one vector upon another. Application of cross product in finding vector area and moment of a force.

**Unit 4**

**TRIGONOMETRY:** Trigonometric Ratios of associated, compound, multiple and sub-multiple angles. Inverse trigonometric functions – Definition, formulae and simple problems. Properties of Triangle – sine, cosine and tangent formulae - Simple Problems.

**Unit 5**

**COORDINATE GEOMETRY & MENSURATION:** Co-ordinate System, Cartesian & Polar co-ordinate system, Distance formula and section formula, Area of a triangle and condition for collinearity. Straight Line, Equation of straight line in slope point form, intercept form, two-point form, two-intercept form, normal form. General equation of a straight line. Angle between two straight lines – Condition for parallelism and perpendicularity. Length of perpendicular from a point on a line. Perpendicular distance between two parallel lines. CIRCLE: Equation of circle in standard form, centre-radius form, diameter form, two-intercept form. General equation of circle with a given centre and radius. Simple Problems. Conic Section: Standard equations of parabola, ellipse & hyperbola. Definition of focus, vertex, directrix, axes, eccentricity. Simple problems. MENSURATION: Regular Polygon of n sides – Formula for area and perimeter. Prism and Pyramid – Formula for volume & Surface area. Simple Problems.

**Text Books:**

1. B.K. Paul, Diploma Engineering Mathematics (Vol-1), U.N. Dhar & Sons
2. A. Sarkar, Mathematics (First Semester), Naba Prakashani
3. G.P. Samanta, A Text Book of Diploma Engineering Mathematics, Volume-1, Learning Press

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4. Dr. S. Bose & S. Saha, A Complete Text Book of Mathematics, Lakhsmi Prakasan

**Reference Books:**

1. H.S. Hall & S.R. Knight, Higher Algebra Book Palace, New Delhi
2. S.L. Loney, Trigonometry S. Chand & Co.
3. H.K. Dass Engineering Mathematics S. Chand & Co.
4. T.M. Apostol Calculus, Volume-1, John Wiley & Sons
5. B.K.Pal, K.Das, Engineering Mathematics, Volume-1, U.N. Dhar & Sons
6. B.C. Das & B.N. Mukherjee, Differential Calculus U.N. Dhar & Sons
7. KAR, Engineering Mathematics, Tata McGraw- Hill
8. SINGH, Engineering Mathematics Tata McGraw- Hill

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| DTEI401 | | Instrumentation & Process Control | 60 | 20 | 20 | 30 | 20 | 2 | 1 | 2 | 4 |

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

Q/A – Quiz/Assignment/Attendance, MST- Mid Sem Test.

**Course Objective:**

1. Student should understand and analyze process control & Instrumentation engineering problems.

**Course Outcomes:**

1. Student will be able to describe dynamics of various processes.
2. Student will be able to learn and analyze the effect of various control actions.
3. Student will be able to impart knowledge on the final control elements.
4. Student will be able to know evaluation criteria and tuning techniques of controllers.
5. Student will be able understand and explain the concept of ladder logics on PLC.

**Unit-1**

Fundamental & Importance of Instrumentation, types of instruments, selection of instruments, performance of instruments, error in measurement, calibration & standard, Calibration of Instruments: Methods & analysis, Introduction to Transducer & types, Process Instrumentation , indicating & recording Instruments.

**Unit-2**

Basic concept and objectives of process control, types of control & their application. Concept of automatic control & its classification, Degree of freedom, Classification of variables, Process

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characteristics, Process lag, load disturbance and its effects - Self regulating, interacting and non-interacting process.

**Unit-3**

Control Modes: Definition, Characteristics and comparison of on-off, proportional, integral, Derivative,

**Unit-4**

Actuators: Hydraulic, Pneumatic actuators, Solenoid, E-P converters, control valves, Types, Functions, Quick opening, Linear and equal percentage valve, valve application and selection, Control valve sizing.

**Unit-5**

Introduction to advanced control system like Cascade, Feed forward, Ratio, Selective, Override, Split range and Auctioneering control, Introduction to PLC and its basic ladder logic.

**Process Control Laboratory**

1. Experimental study of PID controller response on a level loop.
2. Controlling of Temperature of water by continuous controllers (P, I, D, PI, PD, PI D).
3. Designing of continuous electronics controllers, (P, I, D, PI, PD, PI D).
4. Study of Electro - Pneumatic Trainer kit and Pneumatic control valves.
5. Study of P to I converter and it's Interfacing to electro-pneumatic kit.
6. Study of I to P converter and it's Interfacing to electro-pneumatic kit.
7. Study of PLC and ladder diagram programming.
8. Controlling of Bottling plant through PLC.
9. Controlling of Water level through PLC.
10. Implementation of traffic light control through PLC.
11. Problem solving in PLC.

**TEXT BOOK:-**

1. C.D. Johnson, "Process control Instrumentation Technology "Prentice Hall Inc., 2007.
2. Bella G. Liptak,"Process control and Optimization", Instrument Engineers Handbook, volume 2,CRC Press and ISA,2005

**REFERENCES:-**

1. Coughanowr, D.R., "Process system analysis and control", McGraw-Hill International, Edition 2004.
2. D.P. Eckman,"Automatic Process controls "John Willey, 7th Edition, and newYork1990.
3. D.M Consedine," Process Instruments and control Handbook", Second Edition, McGraw, 1999.
4. Peter Harriott, "Process Control", Tata McGraw Hill, New Delhi, 1985.
5. Shinskey, "Process Control Systems", 4th Edition, McGraw Hill, Singapore, 1996.

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| DTEI402 | | Microprocessors 8085 &Interfacing | 60 | 20 | 20 | 30 | 20 | 2 | 1 | 2 | 4 |

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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 introduce 8085 architecture and programming in assembly language.
2. To introduce basic concepts of interfacing memory and peripheral devices to a microprocessor.
3. To introduce serial and parallel bus standards

**Course Outcomes (COs):**

After successful completion of the course students should be able to:

1. Understand the architecture of 8085 8-bit Microprocessor.
2. Describe the importance and function of each pin 8085 Microprocessor.
3. Write, Debug and Simulate assembly language program.
4. Interface Memory, Input/output with 8085 Microprocessor.
5. Summarize the functionality of various peripheral chips. .

## Syllabus

**Unit-I**

### Introduction To 8-bit Microprocessor

History of Microprocessor, 8085 Microprocessor architecture, buses, register, flags. 8085 pin configuration & function of each pin. Fetch, Decode and execute operations. Op-code Fetch, execute cycle, T state, Machine cycle. Memory and I/O read and write cycles WAIT state, interrupt timing diagram

**Unit-II**

### Intel 8085 Microprocessor Instruction Set

Intel 8085 Microprocessor Instruction Set, Addressing modes of 8085. Data transfer, Arithmetic, Logical, Rotate, Branch and machine control instructions.

**Unit-III**

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## Interfacing of Memory Chips & Input / Output Chips

Memory mapped I/o and I/O mapped I/O. Address decoding, interfacing of memory chips with 8085. Interfacing of input/output chips with 8085

**Unit-IV**

## Assembly Language Programming

Development of 8085 assembly language programs: time delays. Concept of stack and Instruction related to stack. 8085 interrupts, RST, RIM, SIM instructions. Subroutines and conditional call instruction

**Unit-V**

## Peripherals IC and Applications

Block diagram, Pin description and Interfacing of 8255(PPI) with 8085 Microprocessor.Interfacing of keyboard, display, ADC and DAC to 8255.Block diagram, Pin description and Interfacing of 8253(PIT) with 8085 Microprocessor.Brief description and application of 8259 10 20 PIC, 8251 USART and 8237 DMA Controller.

**Text Books**

1. Microprocessor Architecture, Programming, and Applications with the 8085 –Ramesh S. Gaonkar Pub: Penram International.

**References**

1. 8085 Microprocessor And its Applications, By A. NagoorKani, Third Edition,TMH Education Pvt. Ltd.

**List of Experiments**

1. Write 8085 assembly language program for addition of two 8-bit numbers.
2. Write 8085 assembly language program for subtraction of two 8-bit numbers.
3. Write 8085 assembly language program for multiplication of two 8-bit numbers.
4. Write 8085 assembly language program for division of two 8-bit numbers.
5. Write 8085 assembly language program for one's complement of an 8-bit numbers
6. Write 8085 assembly language program to find factorial of number.
7. Write 8085 assembly language program to find largest number in an arrey.
8. Write 8085 assembly language program to generate square wave and triangular wave.
9. Write 8085 assembly language program to interface 8279 programmable keyboard display controller to 8085 microprocessor.
10. Write 8085 assembly language programto interface 8253 programmable interval timer and verify the operation in six different modes.

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| DTEI403 | | Electronics devices and Circuits | 60 | 20 | 20 | 30 | 20 | 2 | 1 | 2 | 4 |

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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):

To enable the student to be familiar with the structure of basic electronic devices and exposed to the operation and applications of electronic devices.

### 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 demonstrate the operation of BJT.
2. To demonstrate the various biasing technique of BJT.
3. To explain the working of JFET.
4. To analyze the working of amplifier ,oscillator.
5. To analyze the working of Operational Amplifier.

### Syllabus

**Unit-I**

**BIPOLAR JUNCTION TRANSISTOR:**

Transistor Construction, BJT Operation, BJT Symbol, Common Base, Common Emitter and Common Collector Configurations, Limits of Operation , BJT Specifications, Current gains BJT Hybrid Model, Comparison of CB, CE, and CC Amplifier Configurations, UJT and Characteristics.

**Unit-II**

**BJT BIASING**

The DC and AC Load lines, Need for Biasing, Fixed Bias, Collector Feedback Bias, Emitter

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| DTEI404 | | Electro Magnetic Theory | 60 | 20 | 20 | 0 | 0 | 3 | 1 | 0 | 4 |

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### Course Objectives:-

1. Obtain an understanding of physical laws governing electromagnetic effects in the form of Maxwell's equations
2. Understand the concepts of static and time varying fields with an emphasis on wave propagation

### Course Outcomes:-

After completion of this course students should be able to

1. Apply vector calculus to determine the electric and magnetic fields and energy stored due to specified charge and current distribution.
2. Apply Maxwell's equation in Differential and integral forms for the solution of appropriate problems involving static as well as time varying fields.
3. Discuss and analyze propagation of electromagnetic waves in free space, dielectric and conducting media

### Syllabus

### UNIT I – ELECTROSTATICS I

Introduction to various Co-ordinate systems and Co-ordinate transformations, Vector calculus, Divergence and Stokes theorem, Laplacian of a scalar and vector, Coulomb's law, Electric field intensity, Electric fields due to: point, line, surface and volume charge distributions, Electric flux density, Gauss's law and its application, Electric potential, Potential gradient, Electric dipole: dipole moment, potential & electric field intensity due to dipole, Energy stored in electrostatic fields, Method of images.

### UNIT II – ELECTROSTATICS II

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Poisson's and Laplace's equations, Solution of Laplace's equation, Uniqueness theorem, Capacitor and capacitance, Electric boundary conditions, Different electric currents and current densities , Behavior of different electrical materials in electric field, Equation of continuity and relaxation time, Ohms law in point form.

## UNIT III – MAGNETOSTATICS

Magnetic field intensity, Magnetic flux, Magnetic flux density, Biot-Savart Law, Magnetic field due to: straight conductors, circular loop, infinite sheet of current, Ampere's circuital law and its application, Magnetic scalar and vector potential, Force on a moving charge and current elements, Force and torque on closed circuit, Magnetic dipole, Magnetic polarization, Self and mutual inductance, Energy stored in magnetic fields, Magnetic boundary conditions.

## UNIT IV – TIME VARYING FIELDS

Faraday's Law, Induced EMF for time varying fields, Displacement current, Maxwell's equation in point form, Maxwell's equation in integral form, Concept of retarded potential, Poynting vector theorem, Complex poynting vector.

## UNIT V – ELECTROMAGNETIC WAVES

Solution of wave equation, Propagation of plane EM wave in: perfect dielectric, lossy medium and good conductor, Media-attenuation, Phase velocity, Group velocity, Skin depth. Reflection and refraction of plane electromagnetic waves at boundaries for normal & oblique incidence, Snell's law of refraction, Brewster angle, Polarization of electromagnetic wave: linear, circular and elliptical polarization.

## TEXT BOOKS

1. Matthew. N.O. Sadiku, "Elements of Electromagnetics", Oxford University Press, First Indian Edition, 2010.
2. Shankar Prasad Ghosh, Lipika Datta, "Electromagnetic Field Theory", McGraw Hill,1st edition, 2012
3. William Hayt, "Engineering Electromagnetics", McGraw Hill, 7th edition, 2011.
4. Gangadhar.K.A, "Field theory", Khanna Publishers, New Delhi, 15th edition, 2004.

## REFERENCES

1. David K Cheng, "Field and Wave Electromagnetics",Pearson Education, 2nd edition, 2004.
2. John D. Kraus, "Electromagnetics" McGraw Hill, 5th edition, 1999.
3. Narayana Rao N, "Elements of Engineering Electro Magnetics", Prentice Hall of India, 6th edition, 2008.

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## Diploma in( Electronics and Instrumentation) w.e.f July2017

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| | | | END SEM University Exam | Two Term Exam | Teachers Assessment* | END SEM University Exam | Teachers Assessment* | | | | |
| DTEI405 | | PLC Lab | 0 | 0 | 0 | 30 | 20 | 0 | 0 | 4 | 2 |

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:**

11. To understand PLC and its types with their applications.
12. To introduce ladder logic, its hardware and software terminology.
13. To implement the basic logic gates using universal logic gates through PLC.
14. To analyze Boolean logic expression and program it through PLC.
15. Implement half adder, full adder, and subtractors.
16. Design multiplexers and Demultiplexer through PLC ladder logic.
17. Design Encoder and Decoder through PLC.
18. To implement and design timer and counter logic functions using PLC.
19. To analyze various pneumatic control valve and design its ladder logic.
20. Design and program ladder logic for traffic controller.

**Text Books:**

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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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