UNIVERSITY POLYTECHNIC
BIT MESRA, RANCHI

SYLLABUS

SEMESTER-III

Diploma in Electrical & Electronics Engineering

(WEF 2018)

UNIVERSITY POLYTECHNIC
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Course Structure
Diploma in Electrical & Electronics Engineering

Third Semester

Subject Code	Subject	Theory	Tutorial	Lab.	Credit
DMA 3101	Applied Mathematics	3	1	0	3
DEE 3005	Analog Electronics	3	1	0	4
DCS 3001	C Programming	3	1	0	4
DEE 3003	Transformer & DC Machine	3	0	0	3
DEC 3003	Digital Electronics	3	0	0	3
DCS 3002	C Programming Lab.	0	0	2	1
DEE 3006	Analog Electronics Lab.	0	0	2	1
DEE 3004	Transformer & DC Machine Lab	0	0	2	1
DEC 3004	Digital Electronics Lab.	0	0	2	1
DHU 3002	Professional Practices-II	0	0	2	1
DGA3002/04/06/08	PT and Games/NSS/NCC/CA	0	0	2	1
	Periods per week	**15**	**3**	**12**	-
	Total credits	-	-	-	**23**
	Total Periods per week	-	-	-	**35**

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Diploma in Electrical & Electronics Engineering(Semester-III)

DMA 3101 APPLIED MATHEMATICS

OBJECTIVE

Students will be able to

1. Develop the essential skills of using Partial Differentiation and Multiple Integrals for applications in engineering.
2. Learn and apply Vector Analysis to solve technical problems.
3. Learn to use First order ODEs necessary for modeling engineering problems.
4. Acquire necessary ability to use Second order ODEs to design engineering models.
5. Learn and appreciate basic probability and statistical methods.

Module-I: Partial Differentiation and Multiple Integrals

1.1 Functions of two or more variables. Partial derivatives of first and higher order.

1.2 Differentiation of composite functions. Jacobians and its properties.

1.3 Evaluation of double integral. Change of order of integration.

1.4 Finding area and volume using double integration. Change of variables from Cartesian to polar.

Module-II: Vector Calculus

2.1 Definition Vector functions and its derivative. Velocity and acceleration.

2.2 Concepts of Scalar and Vector Fields. Gradient of scalar field. Directional Derivative and its geometrical interpretation. Properties of Gradient.

2.3 Divergence and Curl of a vector function and their properties. Physical interpretation of divergence and curl.

2.4 Integration of vector functions. Concept of line integral. Work done by a force. Surface and volume integral.

Module-III: Ordinary Differential Equations (ODE) of First Order

3.1. Definitions of ODE and meaning of solution of ODE. Formation of ODE.

3.2. Solution of ODE of first order and first degree: Variable separable method, Homogenous equations, Equations reducible to homogenous form, Exact equations, Linear equations, Bernoulli equations.

Module-IV: Linear Differential Equations of Second and Higher Order

4.1. Definition of linear ODE. The operator 'D'. Auxiliary Equations (A.E.) and rules of finding Complementary Function (C.F.).

4.2. The inverse Operator $\frac{1}{f(D)}$. Rules for finding the Particular Integral (P.E.).

Module-V: Statistics and Probability

5.1 Measures of Central tendency (mean, median, mode) for ungrouped and grouped frequency distribution.

5.2 Measures of Dispersion such as range, mean deviation, Standard Deviation, Variance and coefficient of variation.

5.3 Definition of random experiment, sample space, event, Occurrence of event and types of events (impossible, mutually exclusive, exhaustive, equally likely).Definition of Probability, addition and multiplication theorems of Probability.

Text Books:

1. N.P. Bali and Manish Goyal. "A Textbook of Engineering Mathematics". Laxmi Publications Pvt. Ltd.

Reference Books:

1. B. S. Grewal. Higher Engineering Mathematics. Khanna Publication, New Dehli.
2. Erwin Kreyszig. Advanced Engineering Mathematics. John Wiley & Sons, Inc.
3. Murray R Spiegel. Vector Analysis and an Introduction to Tensor Analysis. Schaum's Outline series. McGraw-Hill.

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Diploma in Electrical & Electronics Engineering (Semester-III)

DEE 3005 ANALOG ELECTRONICS

OBJECTIVE

1. To provide introductory concepts of AC to DC conversion
2. Draw the characteristics of basic components like diode, transistor etc.
3. To give ideas about Unipolar and Bipolar Devices
4. To acquaint about different types of amplifiers and oscillators
5. To provide knowledge of Operational Amplifier

Module-I Rectifier Circuit and Filters:

Classification of rectifiers, Analysis of half wave and full wave rectifiers, Calculation of DC voltage, RMS voltage, Ripple factor, Efficiency of rectification, TUF, Voltage regulation. Capacitor filter, Inductor filter, LC filter, & CLC (π) filters.

Module-II Bipolar Junctions & Fits:

Transistor circuit configurations & its characteristics, CE, CB and CC Configurations of Amplifier, DC load line, Q-point, DC equivalent circuit, Bias Stabilization, Stability factor, Transistor as an Amplifier, Types of biasing circuits: Fixed bias, Emitter bias, Voltage divider bias & Collector to base bias. Classification of FET, Advantages of FET over BJT, FET parameters, Different Configurations of FET Amplifiers, principle, Working V-I Characteristics and Transfer Characteristics. Introduction to MOSFET.

Module-III Transistor Amplifier:

Single stage transistor amplifier circuit, AC load line and AC equivalent circuit, h-parameters of transistors, Simplified h-parameters of transistors, Calculation of i/p, o/p and gains in different configurations of Amplifier, Multi stage amplifier, Types of coupling of amplifier – RC coupled, transformer coupled, direct coupled and their frequency response and bandwidth.

Module-IV Feedback Amplifier and Oscillator:

Introduction to Feedback, Types of feedback, advantages and disadvantages of Negative feedback, Feedback topologies:- Different types of feedback circuits, Practical circuits of voltage series feedback and current series feedback, Barkhausen Criterion of oscillation, Different types of oscillator circuits: Tuned Collector, Hartley, Colpitt's, Phase shift, Wein bridge and crystal oscillator.

Module-V Operational Amplifier:

Operational Amplifiers-General circuit of OP-AMP, Ideal characteristics, Pin diagram IC 741, Block diagram, Open loop OP-AMP configuration, Inverting and Non inverting OP-AMP circuits, Differential amplifier, Instrumentation amplifier, Bridge amplifier, Comparator, Schmitt trigger, Adder circuit, Integrator, Voltage follower.

Text and Reference Books:

1. Integrated Electronics- Millman and Halkias, McGraw-Hill.
2. Operational Amplifier by Anshunan Gaykeward, PHI Publishers, New Delhi
3. Electronic Principle Albert Malvino David J Bates; Tata McGraw Hill
4. Principle of Electrical and Electronics Engineering - V.K.Mehta, S.Chand and Co.

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Diploma in Electrical & Electronics Engineering (Semester-III)

DCS 3001 C PROGRAMMING

OBJECTIVE

1. To understand basic programming concepts and write simple programs.
2. To use operators and library functions for writing arithmetic expressions.
3. To apply programming logic and develop problem solving approach.
4. To use arrays for developing more efficient logic.
5. To apply function oriented approach in program design.

Module-I:

Programming techniques and overview of c language

Algorithm and programming development, steps in development of a program, flowcharts, algorithm development, program debugging, program structure. formatted input, formatted output, assignment statements, constant, variables and data types.

Module-II:

Operators and Expressions

Arithmetic, relational, increment, decrement, assignment, logical and conditional operators, operator precedence and associativity, type casting, sizeof() operator, Math functions sqrt(), pow(), sin(), cos() and tan().

Module-III:

Decision Making and Branching:

if statement (if, if-else, else-if ladder, nested if-else), switch case statement, break statement, goto. Decision Making and Looping: while-do, do-while statements, for loop, continue statement

Module-IV:

Arrays and Strings

Declaration and initialization of one dimensional, two dimensional and character arrays, accessing array elements. Declaration and initialization of string variables, string handling functions from standard library (strlen (), strcpy (), strcat (),strcmp ()).

Module-V:

Functions and Pointers

Need of functions, scope and lifetime of variables, defining functions, function call (call by value, call by reference), return values, storage classes. Category of function (No argument No return value, No argument with return value, argument with return value), recursion.
Pointers: Understanding pointers, declaring and accessing pointers, Pointers arithmetic, pointers and arrays.

Text Books

1. E Balagurusamy, "Programming in ANSI C" Tata McGraw-Hill, New Delhi.

Reference Books

1. Ashok N. Kamthane, "Programming in C" Pearson Education India, New Delhi

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Diploma in Electrical & Electronics Engineering (Semester-III)

DEE 3003 TRANSFORMERS AND DC MACHINE

OBJECTIVE

Students will be able to

1. Know the constructional details & working principles of machines & transformers.
2. Various types of tests of DC machines and transformers.
3. Evaluate the performance of dc motors & transformers by conducting various tests.
4. Decide the suitability of dc generators / motors & transformer for particular purpose.
5. Know the specifications of dc machines & transformers as per requirement.

Module-I Transformer:

Introduction, Ideal transformer, E.M.F. equation & voltage transformer ratio, step up & step down transformer, transformer construction, losses & efficiency, transformer in DC supply, rating, voltage regulation, practical transformer, types of transformer, parallel operation of single-phase transformer.

Module-II Auto Transformer and Instrument Transformer:

Introduction, autotransformer construction, working & application, conversion of 2-winding transformer into auto transformer, current transformer (CT) and potential transformer (PT)

Module-III Three Phase Transformer:

Introduction, advantages & disadvantages, types of 3-phase transformer connections, parallel operation & load sharing, power transformer & distribution transformer, cooling of transformer.

Module-IV DC Generators:

Principle of operation & Constructional details, Types of DC Generators, EMF equation, Lap and wave winding. No load characteristics of self-excited (shunt generators, Load characteristics of self-excited(Series, Shunt & Compound) generators - Critical resistance, Armature reaction, Commutation, Causes of voltage drop, Losses and Efficiency, Applications of DC Generators.

Module-V DC Motors:

Principle of operation - Torque, Back emf & Speed equations. classification & Characteristics of shunt , series & compound motors, Applications, Various method of Speed control, Necessity of starter, 3 point starter , 4 point starter, Losses and efficiency.

Text Books:

1. B.L. Theraja, "A Text-Book of Electrical Technology",VOL.II, S. Chand & CO, Delhi.
2. P.S. Bhimbhra, "Electrical Machinery"; Khanna Publications.

Reference Books:

1. Edward Hughes, "Electrical Technology"; Logmans, London
2. D.P. Kathari & I.J Nagrath, "Electrical Machines"; TMH, New Delhi 2010.
3. Alexander S. Langsdorf, "Theory of direct current machinery"; TMH, New Delhi.
4. H. Cotton, "Electrical Technology", C. B. S. Publisher New Delhi.

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Diploma in Electrical & Electronics Engineering (Semester-III)

DEC3003 DIGITAL ELECTRONICS

OBJECTIVE

Student will be able to:

1. Know the fundamental principles of Digital circuits
2. Familiar with available IC chips.
3. Understand number systems, logic gates, flip-flops, registers and counters.
4. Simplify logic functions.
5. Identify and differentiate between various types of memories.
6. Describe working of multivibrators and simple linear wave shaping techniques.

Module-I:

Fundamentals: Binary numbers, Octal and Hexadecimal numbers, Conversion from one number system to another, BCD numbers, Binary arithmetic, floating point number system, Binary codes, Error detection codes. Boolean Algebra, Boolean Theorems, De-Morgan's Theorem, Duality Theorems, Minimization using Boolean Algebra / Boolean Theorems Logic Gates.

Module-II:

Simplification: Maxterms and Minterms (Standard and Canonical forms), SOP and POS forms of expressing functions, Karnaugh Map (K-map) method of minimization of functions.

Combinational Logic Circuits: Half adder and Full adder circuit, design and implementation. Binary Encoder, Binary Decoders, Parity Generators/Checkers, Controlled inverter, Adders, Multiplexers, Demultiplexers.

Module-III:

Flip – Flops: Concept and types of latch with their working and applications, Operation using waveforms and truth tables of SR flip-flop -Clocked and Unclocked, D-flip-flop, J-K flip-flop, Master-slave JK flip-flops, Difference between a latch and a flip flop, Realization of one flip-flop using other.

Module-IV:

Registers: Introduction and basic concepts including shift left and shift right, Serial in parallel out, serial in serial out, parallel in serial out, parallel in parallel out, Bi-directional Storage Register, Universal shift register, Buffer register, Tristate Buffer register , IC 7495.

Counters: Introduction to Asynchronous and Synchronous counters, Binary counters, Divide by N ripple counters, Decade counter, Pre settable and programmable counters, Up/down counter, Ring counter with timing diagram, Counter ICs and Memories.

Module-V:

Multivibrators: Transistor based Multivibrators, Circuit, working procedure and applications of Astable, Bistable & Monostable multivibrators.

Linear wave Shaping: Series and Parallel diode clipping circuit, Clamping a waveform to zero level.

Text and Reference books :

1. Digital Electronics (Circuits, Systems & Ics) by S. N. Ali (Galgotia Publishers).
2. Pulse and Digital Circuits by Mothiki S. Prakash Rao (TMH)

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Diploma in Electrical & Electronics Engineering (Semester-III)

DCS 3002 C PROGRAMMING LAB.

LIST OF EXPERIMENTS

1. Write Programs in C to implement.
2. Programming Exercise on Executing and Editing a C Program.
3. Programming Exercise on defining Variable and assigning values to variables.
4. Programming Exercise on arithmetic's and relational operators.
5. Programming Exercise on arithmetic expression and their evaluation.
6. Programming Exercise on formatting input/output using printf and scanf
7. Programming Exercise using if-statement.
8. Programming Exercise using if-else statement.
9. Programming Exercise on switch statement
10. Programming Exercise on do-while statement.
11. Programming Exercise on for statement.
12. Programming exercise on one-dimensional array and two-dimensional array.
13. (i) Programs for putting two strings together (ii) Programs for comparing two strings.
14. Simple programs using structures and Union.

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DEE 3006 ANALOG ELECTRONICS LAB.

LIST OF EXPERIMENTS

1. Observe the wave shape of following rectifier circuit
   a. Half wave rectifier b. Full wave rectifier c. Bridge rectifier
2. Plot the wave shape of full wave rectifier with
   a. Shunt capacitor filter b. Series inductor filter c. RC filter
3. Plot input and output characteristics and calculate parameters of transistors in CE configuration.
4. Plot input and output characteristics and calculate of parameters of transistors in CB configuration.
5. Plot V-I characteristics of FET amplifier.
6. Measure the Q-Point and note the variation of Q-Point.
   a. By increasing the base resistance in fixed bias circuit.
   b. By changing out of bias resistance in potential divider circuit.
7. Measure the Voltage Gain, input, output impedance in single state CE amplifier circuit
8. Plot the frequency response of two stage RC coupled amplifier and calculate the bandwidth and compare it with single stage amplifier
9. To measure the gain of push-pull amplifier at 1KHz
10. To measure the voltage gain of emitter follower circuit and plot its frequency response
11. Plot the frequency response curve of Hartley and Colpitts Oscillator
12. Plot the frequency response curve of phase shift and Wein bridge Oscillator
13. To study of Op-Amp as

    i) differential circuit ii)adder circuit iii)integrator circuit.

14. To determine voltage gain of inverting and Non-Inverting amplifier.

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DEE 3004 TRANSFORMER AND DC MACHINE LAB.

LIST OF EXPERIMENTS

1. Open circuit and load characteristics of DC exciter machine.
2. Open circuit and load characteristics of DC compound generator.
3. Performance Characteristics of constant speed DC motor.
4. Speed control of constant speed DC motor.
5. Load test on dc traction motor.
6. Predetermination of performance characteristics of dc machine.
7. Back to back test on identical DC exciter machines.
8. Predetermination of performance characteristics of ac dynamic machine.
9. Load test on single phase transformer.
10. Load test on DC compound motor.
11. Parallel operation of single phase transformers.
12. Connections of three phase transformer.

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DEC 3004 DIGITAL ELECTRONICS LAB

LIST OF EXPERIMENTS

1. Verification of basic Logic gates
2. Verification of Universal logic gates and realization of basic gates
3. Design and implementation of code converters using logic gates
   (i) BCD to excess-3 code and vice versa (ii) Binary to gray and vice-versa
4. Prove DE – Morgan's 1st theorem.
5. Prove DE – Morgan's 2nd theorem.
6. Design and realization of S.R. flip-flop using IC 7400.
7. Design and realization of J.K. flip-flop using IC 7400.
8. Design and realization of a 4-bit magnitude comparator using IC 7485.
9. Design and realization of a parity bit checker using IC 7486.
10. Design and realization of parity bit generator using IC 7486.
11. Design and implementation of 4 bit binary Adder/ Subtractor and BCD adder using IC 7483
12. Design and implementation of Multiplexer and De-multiplexer using logic gates
13. Design and implementation of encoder and decoder using logic gates
14. Construction and verification of 4 bit ripple counter and Mod-10 / Mod-12 Ripple counters
15. Design and implementation of 3-bit synchronous up/down counter
16. Implementation of SISO, SIPO, PISO and PIPO shift registers using Flip- flops.
17. Construction of Half Adder and Full Adder.
18. Simplification and Realization of Boolean Functions, using NAND gates only.

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Diploma in Electrical & Electronics Engineering (Semester-III)

DHU3002 PROFESSIONAL PRACTICES-II

OBJECTIVE

Student will be able to:

1. Acquire information from different sources.
2. Prepare notes for given topic.
3. Present given topic in a seminar.
4. Interact with peers to share thoughts.
5. Prepare a report on industrial visit, expert lecture
6. Fault detection and basic repair of lab. equipment like Multimeter, CRO, UPS.

Module-I:

Field Visits: Structured field visits (minimum three) be arranged and report of the same should be submitted by the individual student, to form a part of the term work. The field visits may be arranged in the following areas / industries:

Power supply/UPS/SMPS/Inverter manufacturing unit, Electronics Instruments calibration laboratories, Residential building for Electronic security systems, Small hydro power station, wind mill.

Module-II:

Lectures by Professional / Industrial Expert:(any four fields)

Non-conventional energy sources, Energy audit, Water pollution control, Software for P.C.B. layout, Mobile communication, Various government schemes, Industrial hygiene, Hydro power generation.

Module-III:

Seminar : Students (Group of 4 to 5 students) have to search /collect information about the topic through literature survey, visits and discussions with experts/concerned persons:

Students will have to submit a report of about 10 pages and deliver a seminar for 10 minutes on Any one of the topics: Water supply schemes/Problems of drinking water in rural area, Problems related to traffic control, Electronic rolling display, Electronic systems used in Multiplex, Any other suitable topic.

Module-IV:

Repair and maintenance of the following Items: CRO, Multimeter, UPS, Power supply.

Module-V:

Market Survey: A group of four students is expected to collect information from the market regarding specifications and cost of any four items: CRO, Multimeter, UPS, Power supply for brand name, specifications, cost and applications.

SYLLABUS

SEMESTER-IV

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Fourth Semester

Subject Code	Subject	Theory	Tutorial	Lab.	Credit
DEE 4103	Electrical Power Generation	3	0	0	3
DEE 4019	Applied Communication	3	0	0	3
DEE 4011	Electrical & Electronics Measurement	3	1	0	4
DEE 4013	AC Dynamic Machine	3	0	0	3
DEC 4017	Microprocessor and its Applications	3	1	0	4
DAC 4001	Environmental Science	2	0	0	2
DEE 4020	Applied Communication Lab.	0	0	2	1
DEE 4012	Electrical & Electronics Measurement Lab.	0	0	2	1
DEE 4014	AC Dynamic Machine Lab.	0	0	2	1
DEE 4016	Electrical Drawing(CAD) Lab.	0	0	2	1
DEC 4018	Microprocessor Lab	0	0	2	1
DHU 4002	Professional Practices-III	0	0	2	1
	Periods per week	**17**	**2**	**12**	**-**
	Total credits	**-**	**-**	**-**	**25**
	Total Periods per week	**-**	**-**	**-**	**31**

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Diploma in Electrical & Electronics Engineering(Semester-IV)

DEE 4103 ELECTRICAL POWER GENERATION

OBJECTIVE

The student will be able to:

1) Explain the working of different power plants
2) Identify different components for various systems in generating stations
3) Select suitable sites for different power stations
4) Define the terms used in economics of power generation and explain their relation
5) Select alternative energy sources for given conditions
6) Explain the working of wind mills and solar systems

Module–I Thermal Power Station:

Explain thermal energy conversion process with block diagrams, Identify the appropriate site of a TPS, Describe the working of thermal power station (TPS) Using single line diagram, State the functions of the major equipment and auxiliaries of a TPS, Distinguish between load curve and load duration curve, Differentiate between base load and peak load power.

Module–II Hydro Power Station:

Explain hydro energy conversion process with block diagrams, Identify the appropriate site, Classify the different types of HPS, Differentiate between different types of Hydro Turbines.

Module–III Nuclear Power Station:

Explain energy conversion process with block diagrams, State special precautions required for Nuclear Power Station. Explain the working of Nuclear power station, Describe various types of reactors, State special precautions required for Nuclear Power Station.

Module-IV Solar Power Plant:

Explain the various solar energy parameters required for electrical power generation and their measurement, Describe the working of Solar concentrated power (CSP) system, Explain principle of solar photovoltaic (PV)systems, Solve simple numerical related to solar PV Discriminate between different types of solar PV systems, State the major safe practices for a solar PV power plant.

Module-V Wind Power Plant:

Describe the power curve of wind turbines with single line sketches, explain the large wind farms in Ranchi, State the major safe practices in the maintenance of large WPPs and small wind turbines, Differentiate Horizontal Axis Wind Turbine(HAWT) and Vertical Axis Wind Turbine (VAWT), Distinguish between downwind and upwind wind turbines, Differentiate the construction of a geared, direct drive and hybrid (Semigeared large wind power plants (WPPs), Differentiate the three types of aerodynamic control of WPPs Using the power curves, Evaluate the suitability of various types of electric generators adapted in large WPPs.

Text & Reference Books:

1. Electrical Power system Mehta, V.K.
2. Renewable Energy Technologies Solanki, Chetan S.
3. Electrical Power Uppal, S.L

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Diploma in Electrical & Electronics Engineering (Semester-IV)

DEE 4019 APPLIED COMMUNICATION

OBJECTIVE

Students will be able:

1. To know the basics of signals needs of modulation and multiplexing techniques.
2. To know the modulation and de-modulation methods of AM wave, identify different section in radio receiver.
3. To describe FM system, comparison between AM, FM & PM and troubleshooting AM/FM radio receivers.
4. To know the comparisons between analog and digital communication, Channel capacity, entropy, Shannon-Hartley theorem, channel noise and its effect.
5. To know Sampling theorem, Nyquist rate, aliasing, PAM, PWM, PPM, PCM transmitter and receiver, quantization error, companding and inter symbol interference.

Module-I:

Communication of Signals ad Transmission Media:

The communication process, sources of Information, Message and signals, classification of signals, Block diagram of communication system, Modulation, needs of modulation, Radio frequency spectrum, Coaxial cable and Optical fibers. Multiplexing, Frequency division multiplexing (FDM) and Time division multiplexing (TDM).

Module-II:

AM Transmitter and Receiver:

Generation of AM wave, low level and high level modulation, Mathematical representation of amplitude modulated wave, Bandwidth requirement, AM transmitter block diagram, Modulation and Demodulation of AM Waves Super heterodyne receiver, Receiver parameters: sensitivity, selectivity, fidelity, tracking, image frequency and its rejection, IF amplifiers.

Module-III:

FM Transmitter and Receiver:

Mathematical representation of frequency and phase modulation, Narrow-band FM, wideband FM, transmission BW of FM waves. Generation of frequency modulated waves, Demodulation of FM waves, Pre-emphasis and de-emphasis, Block diagram of FM receiver Comparison between AM and FM.

Module-IV:

Introduction of Digital Communication:

Block diagram of basic digital communication system; Channel capacity-definition, Hartley's law, Shannon-Hartley theorem, Channel capacity equation, channel noise and its effect, entropy, Advantages and disadvantages of digital communication.

Module -V:

Pulse Communication:

Introduction, comparison with Continuous Wave Modulation, Sampling theorem, Nyquist rate, aliasing, natural and flat top sampling. PAM, PWM, PPM definition, generation, block diagram, waveform analysis, and their comparison.

Pulse code modulation- block diagram of PCM transmitter and receiver, sampling, quantization, quantization error, companying, inter symbol interference.

Text Books:

1. Electronic communication system, Wayne Tomasi, Pearson Education
2. Digital Communication, Siman Haykin, Jhon wiley & sons

References Books:

1. Electronics Communication, Louis E. Frenzl, Tata McGraw Hill
2. Electronic Communications systems, Roy Blake, Thomson
3. Communication System, Roddy Collen, Prentice Hall of India.

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DEE 4011 ELECTRICAL & ELECTRONICS MEASUREMENT

OBJECTIVE

Students will be able to:

1. Identify the measuring instruments used for measuring electrical quantities.
2. Select appropriate measuring instrument with range for measurement of various electrical quantities select and use range multiplier if required.
3. Classify measuring instruments based on construction, principle of operation and quantity to be measured.
4. Know the construction of the instruments.
5. Understand the principles and operation of different measuring instruments.

Module –I Measurement:

Methods of measurement, elements of generalized measurement system, Application of Measurement systems, static and dynamic performance characteristics, Standards and their classification, types of error and their correction.

Module-II Bridge:

DC bridges for measurement of resistance, Kelvin's double bridge, Wheatstone bridge and AC bridges for measurement of L, R, C & M, Maxwell's bridges, Anderson's bridges, Wein's bridges, Measurement of frequency.

Module-III Analog Instruments:

Construction and principle of Moving iron instruments, Moving coil instruments, Ammeter shunts, Voltmeter multipliers, Multirange ammeters and voltmeters.
CRO: Introduction, CRT, Block diagram of CRO, various measurements on CRO.

Module-IV Digital Measuring Instruments:

Digital multimeter, Digital frequency meter and voltmeter, Period and time interval measurement.
Data Acquisition system (DAS): Components of digital & Analog DAS, Digital to Analog Converter. Analog to digital converter

Module –V Transducer:

Classification ,linear variable differential transformer, Capacitive Transducers, Resistive transducer, Resistance Temperature Detector, strain gauges, Thermistor, Piezo-Electric, Thermocouple, Photo-Electric Transducer ,Digital Transducer.

Text Reference Books:

1. Helfrick and copper –Modern electronics instrumentation and Measurement, Pearson Education
2. Sawhney AK –Electrical & electronic Measurements and instrumentation, Dhanpat Rai & Son's.
3.Patranabis D-Sensors and Transducers,Wheeler,1996
4. Kalsi – Electronics instrumentation, TMH Publication, New Delhi
5. Deoblin- Electrical Measurement.
6. Patranabis D – Principles of instrumentation , TMH Publication , New Delhi , 1976 .
7. J B Gupta- Electrical measurements and measuring instruments, S K Kataria & Sons

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Diploma in Electrical & Electronics Engineering (Semester-IV)

DEE4013 AC DYNAMIC MACHINES

OBJECTIVE

Enable the students to

1. Know fully about ac machines.
2. Operation, maintenance and proper connection and hence will enable them to work as a good supervisor.
3. The topics of special motor used and that of electroplating will provide full insight of practical
4. They will learn to use electrical equipment.
5. Know and define the basic elements; electric circuit terminology; energy sources used in electric circuit and also AC waveform and its various quantities.

Module-I:

Three Phase Induction Motors:

Constructional details, Production of rotating magnetic field, Slip, Equation of rotor induced emf, current, frequency , equivalent circuit, steady and running condition, Torque equation ,Starting and running torque of squirrel cage and slip ring induction motor, Condition for maximum torque, Torque slip characteristics, Effect of change in rotor circuit resistance on torque-slip characteristics, Effect of change in supply voltage on torque-slip characteristics.

Module-II

Speed Control & Starting of Three Phase Induction Motors:

Various methods of speed control, Starters of three phase induction motor, comparison between transformer & induction motor, Applications.

Module-III:

Single Phase Induction Motors:

Double field revolving theory, basic types of single phase ac motors, comparison between three phase and single phase ac motors, Applications.

Module-IV:

Alternators:

Introduction, constructional details, advantages of rotating field systems, emf equations, voltage regulation, synchronizing of alternator.

Module-V:

Synchronous Motor:

Principle of working, Synchronous Motor on load with constant excitation, Effect of excitation at constant load, Hunting & phase swinging, synchronous condenser, Applications, Starting of Synchronous Motor, Comparison between Induction motor & Synchronous Motor.

Text Book:

1. A.K. Thereja & B.L.Thereja ,Electrical Technology Volume2

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Diploma in Electrical & Electronics Engineering (Semester-IV)

DEC 4017 MICROPROCESSOR AND ITS APPLICATIONS

OBJECTIVE

Student will be able to:

1. Perform arithmetic operations with help of a standard ALU design.
2. Describe the operational features of A/D and D/A converters.
3. Differentiate between the different types of memories and their applications.
4. Describe the basic architecture of a microprocessors based system.
5. Develop a minimum system with 8085 microprocessors.

Module–I Introduction:

Organization and Block-Diagram of a Simple Micro-Computer, Word-length of a Computer/Microprocessors, Microcontrollers, Embedded Microprocessors, Hardware, Software, Firmware, CPU/Microprocessor – Schematic Diagram, Memory, Buses, Input device, Output device, Microprocessor Applications.

Introduction to 8085 – Microprocessor : Architecture, Pin-description, System Bus – Address Bus, Data Bus, Control Bus, Instruction Cycle, Timing-diagram.

Module-II Instruction sets of Intel - 8085:

Addressing Modes, Groups of Instructions. Simple Programming on Addition, Subtraction, Multiplication, Counting, Looping, BCD to BINARY conversion, BINARY to BCD conversion, sorting etc.

Module-III Peripheral Devices and their Interfacing:

Address space partitioning – Memory mapped I/O Scheme, I/O mapped I/O scheme, Memory and I/O interfacing, Data-transfer schemes, Interrupts of Intel 8085, Brief Introduction to 8255, 8253. Interfacing of these chips with Microprocessor.

Module-IV 8259 Interfacing Chip:

Pin description, interfacing of 8259 and I/O devices, Internal Register of 8259.

Introduction to 8086: Pin-description, operating modes, pin –description for Minimum and Maximum mode, operation, Registers.

Module-V Microprocessor Based Data Acquisition system:

Analog to Digital converter, Digital to Analog converter. D/A-A/D Accuracy & Resolution, Interfacing DAC & ADC with microprocessor.

Microprocessor Applications: Industrial Examples of Temperature Control and Pressure monitoring and their control.

Text book

1. Fundamentals of Microprocessors & Microcontrollers – By – B. Ram

Reference book

1 Digital Computer Electronics – By – Malvino, Brown.
2 Microprocessor Architecture, Programming & Applications – By – R.S.Gaonkar.

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Diploma in Electrical & Electronics Engineering (Semester-IV)

DAC 4001 ENVIRONMENTAL SCIENCE

OBJECTIVE

The main aim of Environmental Science is to make the students acquainted with various types of pollution hazards, which are becoming more critical every day and also acquire the knowledge to participate in solving environmental problems for green earth.

Students will be able to understand:

1. Importance of Environmental Science as well as biogeochemical cycles and food chain
2. Composition and function of various segments of environment
3. Water pollution, various pollutants, their toxic effects and water treatment process
4. Classification, toxic effects and sources of air pollutants and their control measures
5. Brief introduction to Noise Pollution, Soil Pollution and radiation pollution

Module I Multidisciplinary nature of Environmental Science & Ecology

Definition & importance of Environmental Science.

Ecosystem, basic structure of an ecosystem (abiotic and biotic components), nutrient and biogeochemical cycles (carbon cycle, nitrogen cycle, and hydrological cycle), food chain, food web.

Module II Segments of environment:

Atmosphere, hydrosphere, lithosphere, soil profile and composition of soil, biosphere.

Module III: Water Pollution & Waste water treatment

Water resources, sources of water pollution, various pollutants, their toxic effect, potability of water, rain water harvesting, primary and secondary waste water treatment (Trickling filter & Activated sludge process.

Module IV Air Pollution

Classification of air pollutants, toxic effects, sources and their control measures like ESP, catalytic converter and bag house filter.

Module V Noise and Soil pollution:

A brief introduction to Noise Pollution, Soil Pollution and radiation pollution.

Text books:

1. Environmental Chemistry – A. K. Dey
2. A basic course in Environmental studies - Deswal & Deswal

Reference books:

1. Environmental pollution – B. K. Sharma
2. Environmental pollution and control - C. S. Rao
3. Essentials of ecology & environmental Sciences - S.

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Diploma in Electrical & Electronics Engineering(Semester-IV)

DEE 4020 APPLIED COMMUNICATION LAB.

LIST OF EXPERIMENT

1. Observation of signals for double side band AM generation
2. Determination of modulation index from DSB AM wave.
3. Observation of signals for demodulation of AM wave using envelope detector.
4. Observation of signals for demodulation of AM wave using linear diode detector.
5. Observation of signals for modulation of SSB signal.
6. Observation of signals for demodulation of SSB signal.
7. Observation of signals for FM wave using Varactor Modulator.
8. To measure the frequency deviation and modulation index using FM wave.
9. Observation of signals for the demodulation of FM wave using PLL
10. Voice transmission with DSB/SSB AM transmission/reception
11. Observe the effect on reconstructed wave form using sample / hold circuit.
12. To compare the frequency response of 2^{nd} order and 4^{th} order of LPF.
13. Observe waveforms of Pulse Amplitude modulation and demodulation.
14. Observe waveforms of Pulse width modulation (using natural sampling & flat top sampling)

Optional

1. Observe waveforms of Pulse Position modulation (using natural sampling).
2. Observe waveforms of Pulse code modulation and demodulation.
3. Observe waveforms of Delta modulation.
4. Observe waveforms of Adaptive delta Modulation.
5. Observe waveforms of ASK/FSK/PSK modulation & demodulation.

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Diploma in Electrical & Electronics Engineering(Semester-IV)

DEE 4012 ELECTRICAL & ELECTRONICS MEASUREMENT LAB.

LIST OF EXPERIMENTS

1. Study front panel controls of specification of typical CRO.
2. Measure frequency & voltage of the different o/p waveforms of function generator.
3. Measure frequency, voltage, phase difference (by time measurement) using CRO.
4. Using Lissajous pattern find frequency & phase difference of unknown signal.
5. Measurement of Resistance by Kelvin double bridge
6. Measurement of Inductance by using Maxwell's bridge
7. Measurement of Capacitance by Wien's Bridge
8. Measurement of Displacement using LVDT
9. Measurement of weight using strain gauge
10. Characteristics of Photovoltaic cell
11. Characteristics of photoconductive cell
12. Measurement of displacement using LVDT
13. To determine characteristics of PIN Photodiode
14. To determine characteristics of Phototransistor
15. To determine characteristics of Platinum RTD
16. To determine characteristics of NTC Thermistor
17. To determine characteristics of K type Thermocouple

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Diploma in Electrical & Electronics Engineering(Semester-IV)

DEE 4014 AC DYNAMIC MACHINE LAB.

1. To perform no load test on induction motor.
2. To perform blocked rotor test on induction motor.
3. Reversal and Speed control of an Induction motor.
4. To Study of Induction motor starters.
5. To find regulation of a 3 phase alternator by O.C. test.
6. To find regulation of a 3 phase alternator by S.C. test.
7. Determination of 'Regulation' of 3 phase alternator by direct loading.
8. To Study the Synchronization of a alternator with Infinite Bus.
9. To Study the Starting and Reversal of Synchronous motor.
10. Speed control of single phase capacitor (spilt phase) motor.
11. To Study of universal motor.
12. To study shaded pole motor.

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Diploma in Electrical & Electronics Engineering(Semester-IV)

DEE 4016 ELECTRICAL DRAWING(CAD) LAB.

1. (A) Draw a sheet for symbolic representation of various electrical equipment's/machines

   (B) Read the given circuits identify the components & trace the path of flow of current.

2. Draw a sheet of wires & wiring accessories

3. Prepare a drawing sheet showing details of domestic appliances such as Electric iron, electric Geyser, Electric Bell, Hot plate.

4. Draw a sheet of electrical symbols for various electrical devices using CAD.

5. Draw circuit diagrams for Staircase & Godown wiring using CAD.

6. Draw (a) circuit diagram (b) Vector diagram for conducting direct loading test on transformer using CAD.

7. Draw control and power circuit diagrams for DOL and Star/Delta Starter.

Mini Project:

1. Visit electrical Machine lab/workshop & trace the electrical installation. Draw Layout diagram & single line diagram.

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Diploma in Electrical & Electronics Engineering(Semester IV)

DEC4018 MICROPROCESSOR LAB.

LIST OF EXPERIMENTS

1. (a) Write an ALP to add two 8-bit numbers; sum being of 8 Bits. (b) Write an ALP to add two 8-bit numbers; sum may be of 16 Bits.

2. Write an ALP to subtract two unsigned numbers, store the result in memory location XX90H. How would you determine the result obtained is straight binary number or 2's complement? Verify with examples.

3. Write an ALP to multiply two 8-bit numbers, product being of 16 bits.

4. Write an ALP to arrange a data array in ascending order.

5. Write an ALP to arrange a data array in descending order.

6. Write an ALP for 2-bit BCD to BINARY conversion.

7. Write an ALP for BINARY to BCD conversion.

8. Write an ALP for block transfer of data.

9. Write an ALP for addition of two 16-bit numbers, sum may be of 16 bits or more.

10. Write an ALP to find the largest number in a data array.

11. Six bytes of data are stored in memory locations starting at 2050H. Add all the data bytes. Use register B to save any carries generated, while adding the data bytes. Store the sum at two consecutive memory locations 2070H & 2071H. Write an ALP for the above mentioned problem statement.

12. Register BC contains 2793H, and registers DE contain 3182H. Write an ALP to add these two 16-bit numbers, and place the sum in memory locations 2050H & 2051H.

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Diploma in Electrical & Electronics Engineering (Semester-IV)

DHU 4002 PROFESSIONAL PRACTICES-III

OBJECTIVE

Student will be able to:

1. Acquire information from different sources.
2. Prepare notes for given topic.
3. Present given topic in a seminar.
4. Interact with peers to share thoughts.
5. Prepare a report on industrial visit, expert lecture

Fault detection and adopting proper troubleshooting procedure for repair and maintenance.

Module-I:

Field Visits: Structured field visits (minimum three) be arranged and report of the same should be submitted by the individual student, to form a part of the term work.

Module-II:

Lectures by Professional/Industrial Expert:(any four fields)

Disaster management, Industrial Safety, any other suitable topic.

Module-III:

Information Search: Information search can be done through manufacturers, catalogue, internet, magazines; books etc. and submit a report.

Module-IV:

Seminar: Seminar topic should be related to the subjects of fourth semester. Each student shall submit a report of at least 10 pages and deliver a seminar (Presentation time–10 minutes)

Module-V:

Troubleshooting: Reliability Factors of equipment, Maintenance Management, Troubleshooting Procedures, Troubleshooting Aids.

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SYLLABUS

SEMESTER-V

Diploma in Electrical & Electronics Engineering

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UNIVERSITY POLYTECHNIC
BIT MESRA, RANCHI

Course Structure

Diploma in Electrical & Electronics Engineering

Subject Code	Subject	Theory	Tutorial	Lab.	Credit
DEE 5105	Utilization of Electrical energy	3	0	0	3
DEC 5015	Control Systems	3	1	0	4
DEE 5103	Power System	3	0	0	3
DEE 5009	Power Converter	3	0	0	3
DEC 5011	Embedded System	3	1	0	4
DEE 5008	Control Systems Lab.	0	0	2	1
DEE 5104	Power Systems Lab.	0	0	2	1
DEE 5010	Power Converter Lab.	0	0	2	1
DEC 5014	Embedded System Lab.	0	0	2	1
DEE 5012	Project-I	0	0	4	2
	Periods per week	**15**	**2**	**12**	-
	Total credits	-	-	-	**23**
	Total Periods per week	-	-	-	**29**

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Diploma in Electrical & Electronics Engineering(Semester-V)

DEE 5105 UTILIZATION OF ELECTRICAL ENERGY

OBJECTIVE

The students will be able to:

1. Understand the importance of good illumination in factory, residential and flood lighting.
2. Compare different methods of electric heating and welding.
3. Select Electric Drive for specific applications.
4. Explain the working of various components in Electric Traction system and list the advantages.
5. Analyze the electric circuits of refrigerator, water cooler and air conditioner for troubleshooting.
6. Apply various measures for economic aspects of utilizing electrical energy.

Module-I:

Electrical Heating and Welding:

Relative advantages of electrical heating, types of Electrical heating equipment. Resistance oven, design of heating element and control, induction heating and induction furnace core type and coreless furnaces, dielectric heating. Resistance welding – Butt, Spot and Seam welding, Arc welding, carbon arc and metallic arc welding, DC and AC arc welding.

Module-II:

Illuminations:

Definition and luminous flux, luminous intensity, brightness, solid angles luminous efficiency, law of illumination, Incandescent lamp, fluorescent lamps, arc lamps, discharge lamps, sodium and mercury vapour lamps, glare and its minimization, use of reflectors, coefficient of utilization waste light factor, diversity factor, design of illumination scheme, control of light through magnetic amplifier.

Module-III:

Electrolysis and Electroplating:

Faraday's law of electrolysis basic principle of electrolysis, current efficiency, voltage efficiency, extraction of metals viz-zinc, aluminium, refining of metals, electro-deposition and factors influencing electro-deposition, electroplating-copper plating, silver plating nickel plating, power supply for electrolysis process.

Module-IV:

Industrial Control:

Electronic control of DC and AC motors, choice and use of AC and DC motors in different industries, rating and enclosure, types of motors used for lifts, cranes and rolling mills, Ward Leonard speed control, master controller, different methods of speed control, series parallel control, electrical breaking.

Module-V:

Traction and Control of Traction Motor:

General features requirement of an ideal traction system, different system traction, advantage of electric traction system over other system-system of track electrification, alternating and direct current, traction motor, general feature of traction motors, electrical features, mechanical feature, applications. Electrical and mechanical braking, rheostatic braking, regenerative braking.simplified speed time curves for different services, simplified speed time curve factor influencing energy consumption.

Text book:

1. Utilization of electrical power and Electric traction by J.B. Gupta.

Reference Books:

1. Generation ,distribution and utilization of electrical energy by C.L Wadhwa
2. Utilization of electrical power by N.V. Suryanarayana

UNIVERSITY POLYTECHNIC
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Diploma in Electrical & Electronics Engineering (Semester-V))

DEC 5015 CONTROL SYSTEMS

OBJECTIVE: Student will be able to:

1. Learn and understand about open loop and closed loop systems.
2. Feedback control and transfer function.
3. Steady state time response and frequency response analysis.
4. Study of stability.
5. Control actions of electronic controllers.
6. Servo system and its applications.

Module-I:

Introduction to Control Systems: Introduction to Laplace Transform of different function, Inverse Laplace Transform, Use of Laplace Transform to solve differential equation, simple RL, RC and RLC circuit and their analysis using Laplace Transform. Introduction to control system, open loop and closed loop systems with suitable examples, Mathematical Modeling of physical systems.

Module-II:

Control system Representation: Definition of Transfer function, Different types of transfer function, Transfer function of Electrical systems, Transfer function of single input and single output system, Block diagram representation and reduction techniques, Signal Flow Graph, Mason's gain formula.

Module-III:

Time response Analysis: Standard test signals, Concept of Impulse Response, Response of first and second order system to step input, Time Response specification, Types of systems, Steady-state error and error constants for step, ramp and acceleration input.

Module-IV:

Stability & frequency response analysis: Definition of stable, unstable and limitedly stable system, Response terms of various natures of roots, Relative stability, Routh's stability criterion and its application for feedback systems. Frequency response and frequency specifications, Correlation between time response and frequency response, Bode Plot, Gain Margin and Phase Margin, Polar Plot.

Nyquist stability criterion: Principle of Argument, Conformal mapping, Nyquist stability criterion, Application of Nyquist criterion for first three types of transfer function.

Module-V:

Control Actions: Discontinuous & continuous modes; on-off controllers: neutral zone, proportional controllers (offset, proportional band), integral & derivative controllers; PI, PD, PID controllers, DC Servo motor, AC servo motor, Potentiometer, AC Synchro: Transmitter and Receiver, Stepper Motor.

Text and Reference books:

1. Control System by Nagrath and Gopal
2. Control System by KUO
3. Control System by Ogata

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Diploma in Electrical & Electronics Engineering(Semester-V))

DEE 5103 POWER SYSTEM

OBJECTIVE

Student will be able to understand:

1. Various mode of Power Generator.
2. Transmission of Power.
3. Distribution of Power
4. Overhead lines / underground cables.
5. Economic aspect and Tarriff
6. Electrical Substation.

Module-I Basics of Transmission & Transmission Line Components: Introduction to transmission , Necessity of transmission of electricity , Classification & comparison of different transmission systems , Introduction to line components ,types of conductors-Copper, Aluminum & state their trade names, Solid, Stranded & bundled conductors, Line supports – requirements, types, and field of applications.

Module-II Line insulators: requirements types and field of applications , Failure of insulator & reasons of Failure ,Distribution of potential over a string of suspension insulators, Concept of string efficiency, Methods of improving string efficiency , Corona – corona formation, advantages & disadvantages, factors affecting corona, important terms related to corona, Spacing between Conductors, Calculation of Span length & sag Calculation

Module-III Transmission Line Parameters & Performance of Transmission Line: R, L & C of 1-ph & 3-ph transmission line & their effects on line , Skin effect, proximity effect & Ferranti effect, Concept of transposition of conductors & necessity, Classification of transmission lines, Losses, Efficiency & Regulation of line, Performance of single phase short transmission line, Effect of load power factor on performance, Medium transmission lines-End condenser, Nominal T & Nominal л with vector diagram, General circuit & Generalized Circuit Constants(A, B, C, D).

Module-IV Underground Cables: Introduction & requirements, Classification of cables ,Cable conductors, Cable construction ,Cable insulation, Metallic sheathing & mechanical protection ,Comparison with overhead lines, Cable laying ,Causes of failure of cables.

Module-V Substations: Introduction, Classification of indoor & outdoor sub-stations, Advantages & Disadvantages, Selection & location of site, Main connection schemes, Equipment's circuit element of substations, In coming & outgoing lines, Transformers, CT&PT, Relays, CB's, fuses, Isolators, batteries, lightning arresters Insulators, Bus bar's material, types in detail, Connection diagram and layout of sub-stations.

Text and Reference Book :

1. Kathari and Nagrath: power system(publication TMH New Delhi)
2. A.Chakarbarty, M.L.Soni, P.V.Gupta, U.S.Bhatnagar, Power System Engineering, Dhanpat Rai & Co.

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Diploma in Electrical & Electronics Engineering(Semester-V))

DEE 5009 POWER CONVERTER

OBJECTIVE

1. Explain the construction and operation of power semiconductor devices and plot their characteristics.
2. Draw the circuit diagrams and explain the working of controlled rectifiers with appropriate waveforms.
3. Draw the circuit diagrams and explain the working of different types of Inverters with appropriate waveforms.
4. Explain the Voltage and Frequency Control Methods used in Inverters.
5. Draw the circuit diagrams and explain the working of different types of choppers with appropriate waveforms.
6. Apply the power electronic methods of controls in Electrical Engg. field.

Module-I:

Semiconductor Devices

Introduction, uncontrolled, semi controlled and fully controlled devices. Construction and principle of operation of Power diode, Power BJT and Thyristor(SCR), V-I characteristics of Power diode, Power BJT and Thyristor(SCR) , Dynamic turn on and turn off characteristics of SCR, Gate characteristics, Protection, Series & parallel operation of SCR, Construction and principle of operation of MOSFET ,IGBT, UJT and there V-I characteristics.

Module-II:

AC to DC converter and DC to DC converter

Principle of operation, Single phase uncontrolled rectifier, Single phase half controlled rectifier, Single phase fully controlled rectifier with R, R-L and motor load, 3-phase converter, Dual converter. Principle and operation of Buck converter, Boost converter and Buck-Boost converter, with their waveforms and output voltage control.

Module-III:

DC to AC Converter and AC to AC voltage Controller

Principle of operation, half and full bridge inverter, 3-phase inverter, inverter with R-L load, output voltage control, harmonic control. Principle of AC to AC voltage converter, behaviour with R & R-L load, firing circuit of AC to AC converter. single phase cyclo-converter, 3-phase cyclo-converter, output frequency and voltage control.

Module-IV:

DC and AC Drives and control

Single phase half wave drive, semi converter, full converter drive, operation of DC series motor on single phase converter, operation of DC motor from two quadrant converter, Three phase semi converter and full converter DC drives, chopper drives. Induction motor drives: starting & speed control Synchronous motor drives: starting & speed control.

Module-V:

Applications

UPS, SMPS, HVDC Transmission

Books Recommended:

1. Power Electronics – M.H. Rashid
2. Power Electronics – P.S Bhimbhara
3. Fundamentals of Electrical Drives – G.K. Dubey
4. Fundamentals of power Electronics and Drives – A. Chakraborty

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Diploma in Electrical & Electronics Engineering(Semester-V)

DEC 5011 EMBEDDED SYSTEM

OBJECTIVE

Student will be able to:

1. Use data transfer techniques.
2. Describe architecture and operation of microcontroller 8051.
3. Develop assembly language programs using instruction set of 8051.
4. Design and develop microcontroller based systems.
5. Explain various applications of microcontrollers.

Module-I:

Microcontroller series (MCS) – 51 Overview: Architecture of 8051/8031 Microcontroller, Pin details, I/O Port structure, Memory Organization, Special Function Registers (SFRs), External Memory.

Module-II:

Introduction to Intel 8051: Instruction Set; Addressing Modes, Instruction types: Timer operation, Serial Port operation, Interrupts.

Module-III:

Assembly/C programming for Micro controller: Assembler directives, Assembler operation, Compiler operations, De bugger, Simulator.

Module-IV:

Design and Interface: Examples like: keypad interface, 7- segment interface, LCD, stepper motor. A/D, D/A, RTC interface.

Module-V:

Applications: Introduction of PIC Micro controllers, Application of Micro controllers in Communication System.

Text & References books

1. The 8051 Microcontroller and Embedded Systems by Md. Ali Mazidi, PHI.
2. The 8051 Microcontroller by Kenneth J. Ayala, THOMSON, Cengage Learning.
3. Microcontrollers (Theory and Applications) by Ajay V. Deshmukh, Tata McGraw Hill.

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Diploma in Electronics Engineering (Semester-V)

DEE 5008 CONTROL SYSTEMS LAB.

LIST OF EXPERIMENTS

1. To determine Speed- Torque characteristics of DC Servo Motor.
2. To determine Speed- Torque characteristics of AC Servo Motor.
3. Analog PID control response for I and II order system as process.
4. Study and demonstration of Linear System Simulator
5. To demonstrate Potentiometer as error detector.
6. Study and demonstration of AC Synchro: Transmitter and Receiver
7. Stepper Motor Demonstration
8. DC motor speed control
9. DC Position Servo system demonstration
10. Ac Position Servo system demonstration
11. To study Ac Motor
12. Study of Relay control system

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Diploma in Electrical & Electronics Engineering (Semester-V)

DEE 5104 POWER SYSTEM LAB.

1. Determination of IDMT characteristics for an IDMT overcurrent relay for different values of pluck setting multiplier using relay test kit.
2. Power system fault analysis using DC network analyser.
3. Determination of ABCD parameters and voltage profile for an artificial transmission line of 600 Km.
4. To control the receiving end voltage in the transmission line by a micro-computer controlled SVC.
5. Study of various types of meters (power factor, frequency meter, phase sequence meter, wattmeter, ammeter, voltmeter).
6. Connection of transformer winding (star-star & delta-delta).
7. Power factor control of an Inductive load.
8. Determination of phase sequence by 2 bulb and R-C method.
9. To perform Ferro Resonance Phenomenon for a transformer at no load .
10. Earth resistance measurement by earth tester.
11. Measurement of 1-φ power by wattmeter method.
12. Measurement of 1- φ power by energy meter.
13. Study of various Insulators.
14. Power system Line to ground fault analysis using DC network analyser.
15. Power system Line to line fault analysis using DC network analyser.
16. Determination of ABCD parameter and voltage profile for an artificial transmission line of 600 km(using nominal T method).
17. Study of overcurrent relay.

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Diploma in Electrical & Electronics Engineering (Semester-III)

DEE 5010 POWER CONVERTER LAB.

LIST OF EXPERIMENT

1. To study the V-I characteristics of S.C.R. and determine the Break over voltage, on state resistance Holding current & Latching current.
2. To study the v-1 characteristics of a TRIAC in both directions and also in different (1, 2, 3 & 4) modes of operation and determine break over voltages, holding current, latching current and comment on sensitivities.
3. To study the characteristics of MOSFET
4. To study the performance & waveforms of HWR & FWR by using RC triggering Circuit
5. To study the performance & waveforms of U.J.T triggering of S.C.R.
6. To study the AC voltage control by using TRIAC-DIAC combination
7. To study the performance and waveforms of full wave controlled rectifier with Resistance load and Inductive load
8. To study the performance of voltage commutated chopper for constant frequency operations.
9. To study speed control of Induction motor and plot speed v/s α.
10. To study speed control of Universal motor and plot speed v/s α.
11. To obtain variable AC from DC ripple input.
12. To obtain variable AC from DC ripple input.

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Diploma in Electrical & Electronics Engineering (Semester-V)

DEC 5014 EMBEDDED SYSTEM LAB.

LIST OF EXPERIMENTS

1. Development and execution of the program for sending data on port lines.
2. Development and execution of the program for arithmetic operation and time delay.
3. Development and execution of the program for input and output operation.
4. Development and execution of the program for interface LEDs to particular port.
5. Development and execution of the program to generate a square wave on port.
6. Development and execution of the program for logical operators and data conversion.
7. Development and execution of the program PWM waveform generation.
8. Development and execution of the program to display "UNIVPOLY" message on LCD (16x2).
9. To write 8051 C program to send "WELCOME" on serial port continuously.
10. Interface Stepper Motor to Microcontroller 8051 and development and execution of the program to run stepper motor.
11. Interface ADC to Microcontroller 8051 and development and execution of the program to display digital equivalent of analog input
12. Interface DAC to Microcontroller 8051 and development and execution of the program to generate specified voltage.

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SYLLABUS

SEMESTER-VI

Diploma in Electrical and Electronics Engineering

(wef 2018 batch)

UNIVERSITY POLYTECHNIC
BIT MESRA, RANCHI

Course Structure

Diploma in Electrical & Electronics Engineering (Semester-VI)

Subject Code	Subject	Theory	Tutorial	Lab.	Credit
DMT 6001	Total Quality Management	3	0	0	3
DCS 6017	Internet of Things	3	0	0	3
DCS 6003	Computer Hardware	3	1	0	4
DEE 6013	Switch Gear and Protection	3	0	0	3
DEE 6015	Programmable Controller(PLC)	3	1	0	4
	Elective	3	0	0	3
DCS 6004	Computer Hardware Lab.	0	0	2	1
DEE 6016	PLC Lab.	0	0	2	1
DEE 6110	Electrical Workshop	0	0	2	1
DEE 6014	Switch Gear And Protection Lab.	0	0	2	1
DEE 6012	Project-II	0	0	4	2
List of Elective(Any one)					
DEE 6015	Industrial Automation	3	0	0	3
DEE 6017	Non-conventional Energy Sources	3	0	0	3
DEE 6103	Electrical Installation and Maintenance	3	0	0	3
DEE 6019	Electric Traction	3	0	0	3
	Periods per week	**18**	**2**	**12**	**-**
	Total credits	-	-	-	**26**
	Total Periods per week	**-**	**-**	**-**	**32**

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Diploma in Electrical and Electronics Engineering(Semester VI)

DMT 6001 TOTAL QUALITY MANAGEMENT

OBJECTIVE

1. To understand the principles of Total Quality Management (TQM).
2. To identify various components of TQM.
3. To be acquainted with various quality standards.
4. To understand the need for benchmarking and its process, and various quality improvement techniques.
5. To understand the importance of quality circle and identify various issues related with it.

Module-I:

Introduction: - Management Concept, Function or Process, Characteristics of Management.
Total Quality Management Concept, Objective, Scope, Principles of TQM, Evolution of TQM, Difference of Quality Vs Total Quality Management.

Module-II:

Components of Total quality Management: Customer Supplier Relationship in TQM System, Managerial Role in TQM, Value, vision, mission and goals in TQM.
Practices for TQM: TQM and Human Resource Development, Need and Significance of TQM, Process of TQM.

Module-III:

Quality Management Systems: -Need for ISO 9000 and Other Quality Systems, ISO 9000:2000 Quality System – Elements, Implementation of Quality system Documentation, ISO 14000 – Concept, Requirements and Benefits.

Module-IV:

Benchmarking – Introduction, Reasons to Benchmark, Benchmarking Process, Quality Function Deployment (QFD), Cost of Quality, QFD Process. Six- Sigma.

Module-V:

Quality Circle: - Purpose, Benefits, Problem in implementation of quality circles, Requirements of effective quality Circle.

Text and Reference Books

1. Feigenbaum.A.V. "Total Quality Management, McGraw-Hill, 1991.
2. Total Quality Management, Principles & Practice- S.K.Mandal.Vikas Publishing House Pvt Ltd.
3. Oakland.J.S. "Total Quality Management Butterworth – Hcinemann Ltd., Oxford. 1989.
4. Narayana V. and Sreenivasan, N.S. Quality Management – Concepts and Tasks, New Age International 1996.
5. Zeiri. "Total Quality Management for Engineers Wood Head Publishers, 1991.
6. Total Quality Management, - Dr. S. Kumar 2011. Laxmi Publications Pvt. Ltd.

UNIVERSITY POLYTECHNIC
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Diploma in Electrical and Electronics Engineering(Semester VI)

DCS 6017 INTERNET OF THINGS

OBJECTIVE

1. To understand basics of Internet of Things.
2. To understand various wireless communication techniques
3. Understanding use of various protocols.
4. Understanding of various embedded components & physical design.
5. Students will be able to create and implement APIs.

Module-I:

The Internet of Things: An Overview

M2M and Internet of Things Technology Fundamentals, IoT Architectural, design principles and needed capabilities, standards considerations.

Module-II:

Wireless Communication standards

Bluetooth, wifi, PHY/MAC Layer(3GPP MTC, IEEE 802.11, IEEE 802.15), Wireless HART,Z-Wave, Bluetooth Low Energy, Zigbee Smart Energy, DASH7.

Module-III:

Internet Principles

Internet Communications: IP , TCP, Protocol Suite (TCP/IP), UDP, IP Addresses, DNS, Static IP Address Assignment, Dynamic IP Address Assignment, IPv6, MAC Addresses, TCP and UDP Ports, HTTP Ports, Other Common Ports, HTTP, HTTPS: Encrypted HTTP, Other Application Layer Protocols.

Module-IV:

Embedded Devices

Electronics: Sensors, Actuators, Scaling up the Electronics, Embedded Computing Basics, Microcontrollers.

Module-V:

Online Components

Getting started with an API, Legalities, Writing a new API, security, implementing the API & testing.

Text book and Reference books

1. McEwen, Adrian, and Hakim Cassimally,"Designing the Internet of Things", John Wiley & Sons, Incorporated, 2013.
2. Arsheep Bahga &Vijay Madisetti, "Internet of Things: A Hands-On Approach", Paperback – 2015.

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Diploma in Electrical and Electronics Engineering (Semester VI)

DCS 6003 COMPUTER HARDWARE

OBJECTIVE

1. To know various components used inside motherboard.
2. Students will be acquainted with the technologies used in modern microprocessor.
3. Develop understanding of construction & working of various types of memory used inside digital computer.
4. Develop understanding of working of SMPS and UPS.
5. Understand basics of various types of printer, preventive and corrective maintenance.

Module-I:

Motherboard

Motherboard form factors; Layout of motherboard; Components of motherboard ─ chipset, processor socket, expansion slots, power supply connectors, ROM BIOS, CMOS, ports etc.

Module-II:

Microprocessor

Processor Specification, FSB; Evolution of Processor; Modern Microprocessor technology- 64 bit architecture, Hyper-Threading, Multi-core processor, Turbo boost, Smart cache.

Module-III:

Memory

Logical memory Configuration─ Conventional memory, UMA, Extended Memory & Expanded Memory; Memory Physical Packaging; SIMM, DIMM & RIMM memory modules; Memory Banks; Types of Dynamic RAM─ FPM, EDO, BEDO, SDRAM, RD RAM, DDR RAM. Magnetic Storage: Hard Drives─ Hard Drive Construction and Interfaces. File System.

Module-IV:

Power Supply

Power Problems─ Spike, Surge, Brownout and Blackout; EMI (Electromagnetic Interference); ESD; SMPS─ SMPS form factors, connectors and voltages; UPS─ Purpose of UPS, SPS and Double conversion UPS.

Module-V:

Printer, Preventive Maintenance & Troubleshooting

Printer: Working of Dot matrix printer, Inkjet printer and Laser printer**;** Maintenance and Troubleshooting: Preventive Maintenance ─ HDD, CDROM, Viruses detection and Protection; Steps of Logical Troubleshooting, common PC problems.

Text Book

1. Ron Gilster, “PC Hardware: A Beginner’s Guide”, TMH

Reference Books

1. C.A.Schmidt, “The Complete Computer Repair Textbook”, 3e, Dreamtech
2. David Groth, “A+ Complete Study Guide”, 3e

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Diploma in Electrical & Electronics Engineering (Semester-VI)

DEE 6013 SWITCH GEAR AND PROTECTION

OBJECTIVE

Students will be able to:

1. Learn the principles, concept & procedure aspect of switchgear & protection.
2. Identify the various components of switchgear & protection systems.
3. Know the specifications & select switchgear & protection systems.
4. Identify the fault & repairs.
5. Understand operation of various types of relay.

Module-I:

Necessity & functions of protective system, Normal & abnormal conditions. Types of faults & their causes, Short circuit calculations(Symmetrical faults only),Use of current limiting reactors & their arrangements.

Module-II:

Circuit interrupting devices- Fuses -Construction, , Working of Semi enclosed & HRC fuse, characteristics, selection and applications, Isolators- Vertical break, Horizontal break & Pentograph type, Arc formation process, methods of arc extinction – High resistance method, Low resistance or current zero method, related terms – Arc voltage, Recovery voltage & Restriking voltage. Circuit breakers- Concept, Classification, Working principle, Construction, Specification & Applications of H.T – Bulk oil circuit breaker.

Module-III Circuit breaker: Minimum oil circuit breaker (M.O.C.B.), Sulpher Hexa Fluoride circuit breaker (SF_6), Vacuum circuit breaker**.** L.T.- Air circuit breakers (ACB), Miniature circuit breakers (M C B) , Moulded case circuit breaker (M C C B) , Earth leakage circuit breaker (ELCB) , Comparison of fuse & MCCB, Selection of MCCB for motor, Selection and rating of circuit breakers.

Module-IV Protective Relaying:

Introduction to protective relaying, Thermal relay, Over current relay, Directional relay, Differential relay. Distance relay, over current and directional relay applications, Distance protection using impedance relay, Reactance relay, MHO relay.

Module-V Protection of Transformer and alternator:

Abnormalities & faults, Differential, Biased differential, Over current, Earth fault, Inter turn, Restricted earth fault, Over heating protection, Abnormalities & Faults, Differential protection , % Differential protection. Over current, earth fault, inter turn fault, negative phase sequence, over heating protection. Reverse power protections.

Text books

1. Power System Protection &Switch gear: Badrriram and Vishwa karma , TMH Publications.
2. Switch gear and Protection Sunil S. Rao, Khanna Publications.

Reference book

1. The art and science of Protective relaying : C Russel Mason, Wiley Bastern Ltd
2. Power system protection & switch gear: Ravindranath & Chander, New age publications.

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Diploma in Electrical & Electronics Engineering (Semester-VI)

DEE 6015 PROGRAMMABLE LOGIC CONTROLLER (PLC)

OBJECTIVE

Students will be able to learn to:

1. Understand the fundamentals Programmable Logic Controllers systems.
2. Identify the PLC Configuration.
3. Design, edit, test, and document PLC Ladder Logic Programs.
4. Diagnose and troubleshoot PLCs.
5. Specify safety consideration for personnel, field devices and automated equipment.

Module-I Programmable Controllers: Introduction, Principles of Operation: AND, OR, AND-OR, Architecture of Programmable Controllers: Diagnostics, Input/Output System, Programming Devices; Programming the Programmable controller: Programming Languages, Ladder Diagram Instructions, Boolean Mnemonics, Functional Blocks, English like Statement, Software, Configuration, Applications.

Module-II Ladder Diagram Fundamentals: Introduction, Basic Components and Their Symbols: Control Transformer, Fuses, Switches, Indicator Lamps, Relays; Fundamental of Ladder Diagrams: Basic Diagram Framework, Wiring, Reference Designators, Boolean Logic and Relay Logic, Ground Test, The Latch, Two- Handed Anti-Tie Down, Anti- Repeat, Single Cycle, Master Control Relays and Control Zones, Machine Control Terminology.

Module-III The PLC and Fundamental PLC Programming: Update-Solve the Ladder Update: Update, Solve the Ladder, Fundamental PLC Programming: Introduction, Physical components vs. Program Components, Example Problem- Lighting Control, Internal Relays, Disagreement circuit, Majority Circuit, Oscillator, Holding Contacts, Always-ON and Always-OFF Contacts, Ladder Diagrams Having More Than One Rung.

Module-IV Advanced Programming Techniques: Introduction, Ladder Program Execution Sequence, Flip Flops: R-S Flip Flop, One Shot, D Flip Flop, T Flip Flop, J-K Flip flop, Counters, Sequencers, Timers, Flashers, Timed One Shot, Timed Sequencer, Master Control Relays and control Zones**. Mnemonic Programming Code:** Introduction, AND Ladder Rung, Entering Normally Closed Contacts, OR Ladder Rung, Simple Branches, Complex Branches.

Module-V Analog I/O: Introduction, Analog Input: Specifying an Analog Input, Analog Output, Analog Data Handling, Analog Input Potential Problems.

System Integrity and Safety: Introduction, System Integrity, Equipment Temperature Considerations, Fail-Safe Wiring and Programming, Safety Interlocks: Interlock Switches, Pressure Sensitive Mat Switch, Pull Ropes, Light Curtains.

Text Book:

1. Computer-Based Industrial control- Krishnakant, PHI.

Reference Book:

1. Programmable Logic Controllers: Programming Methods and Applcations- John R. Hackworth, Frederick D. Hackworth, Jr., Pearson Education

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Diploma in Electrical & Electronics Engineering (Semester-VI)

DCS 6006 COMPUTER HARDWARE LAB.

LIST OF EXPERIMENTS

1. Study of motherboard:
    a. XT form factor.
    b. AT form factor.
    c. LPX form factor.
    d. ATX form factor.
2. Disassembling of PC:
    a. PC- XT
    b. PC- AT
    c. PC- ATX
3. Assembling of PC:
    a. PC-XT
    b. PC-AT
    c. PC-ATX
4. Study of BIOS Setup.
5. Installation of Windows-XP operating system.
6. Repairing corrupted operating system.
7. Installation of display diver, sound driver, network driver.
8. Managing disk and file system:
    a. Installing two hard disk
    b. Creating primary, extended, logical partition
    c. Formatting a partition
    d. Converting a Basic Disk to a Dynamic Disk
    e. Understanding simple, spanned, striped, Mirrored volume
        i. Creating Simple volume
        ii. Creating spanned volume
        iii. Creating striped volume
        iv. Extending volume size
        v. Deleting simple, striped, spanned volume
9. Preventive maintenance tools**:**
    a. System restore
        i. Creating restore point
        ii. Restore system to earlier date and time.
    b. Disk defragmentation
    c. Scandisk
    d. Installation and configuration of Anti-virus
10. Installation and configuration of VM Ware.

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Diploma in Electrical & Electronics Engineering (Semester-VI)

DEE 6016 PLC LAB

LIST OF EXPERIMENT

1. Components/sub-components of a PLC, Learning functions of different modules of a PLC system

2. Practical steps in programming a PLC (a) using a Hand held programmer (b) using computer interface.
3. Introduction to step 5 programming language, ladder diagram concept.
   - Introduction to ladder programming & to implement basic logic gates
   - Develop, Simulate and Test Ladder diagram for Door Bell Operation
   - Develop, Simulate and Test Ladder diagram for Bottle Filling system
   - Develop, Simulate and Test Ladder diagram for Traffic Light Control System
   - Develop, Simulate and Test Ladder diagram for Car Parking System
   - Develop, Simulate and Test Ladder diagram for an alarm annunciator system
   - Develop, Simulate and Test Ladder diagram for Batch Mixer
   - Develop, Simulate and Test Ladder diagram for Drink Dispenser System
   - Develop and test PLC program for three phase motor in both direction
   - Develop, Simulate and Test Ladder Diagram for stepper motor control in forward and reverse direction
4. Develop, Simulate and Test Ladder diagram for an Elevator systeLogic control systems with time response as applied to clamping operation
5. Sequence control system e.g. in lifting a device for packaging and counting
6. Draw a Ladder logic diagram for two different examples.
7. Perform Stepper motor /Temperature control using PLC/traffic.
8. Identify the parts of hydraulic/Pneumatic Servomotor from Cut-Section/Model
9. Introduction to ladder programming & to implement basic logic gates
10. Develop, Simulate and Test Ladder diagram for Door Bell Operation
11. Develop, Simulate and Test Ladder diagram for Bottle Filling system
12. Develop, Simulate and Test Ladder diagram for Traffic Light Control System
13. Develop, Simulate and Test Ladder diagram for Car Parking System
14. Develop, Simulate and Test Ladder diagram for an alarm annunciator system
15. Develop, Simulate and Test Ladder diagram for Batch Mixer
16. Develop, Simulate and Test Ladder diagram for Drink Dispenser System
17. Develop and test PLC program for three phase motor in both direction
18. Develop simulate and Test Ladder Diagram for stepper motor control in forward and reverse direction.
19. Develop, Simulate and Test Ladder diagram for an Elevator system.

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Diploma in Electrical & Electronics Engineering (Semester-VI)

DEE 6110 ELECTRICAL WORKSHOP

OBJECTIVE

Students will be able to:
1. Know safety measures and state safety precautions.
2. Test single phase, three phase transformer, DC& AC machine as per IS.
3 .Identify/ locate common troubles in electrical machines and switch gear.
4. Plan& carry out routine & preventive maintenance.
5. Install LV switchgear and maintain it.

1. Introduction to Safety precautions, Elementary first aid and treatment of Electrical shocks.

2. Introduction to Tools, Measuring instruments and symbols used in electrical workshops.

3. Introduction to Indian electricity rules (IER) pertaining to domestic and industrial electrification.

4. Various types of wires and cables used for electrical wiring.

5. Various types of wires and cable joint practices.

6. To identify and give connections of wiring accessories.

7. A.C. and D.C. wiring practice for house and workshops.

8. Connection of 1-phase and 3-phase energy meter.

9. To install the overhead service line for building.

10. Visit of substation.

11. Practice for maintenance/repair of house hold appliances (Fans, Washing machines, Kitchen refrigerator, coolers etc).

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Diploma in Electrical & Electronics Engineering (Semester-VI)

DEE 6014 SWITCH GEAR AND PROTECTION LAB.

LIST OF EXPERIMENT

1. To demonstrate HRC fuse, MCB & ELCB and explain the functions of various components.
2. To Identify the components of following types of circuit breakers with their specifications (through visits , video or model).: I) Low tension air circuit breaker.(including protective devices) II) Minimum oil circuit breaker (M O C B) III) Air Blast circuit breaker (ABCB) IV) Sulpher - Hexa fluoride circuit breaker (S F 6) V) Vacuum circuit breaker.
3. To Plot the inverse characteristics of Induction type/ Micrprocessor Based – (i) O/C relay, (ii) E/F relay using Relay Testing Kit.
4. To test percentage Differential Protection of Transformer Using Transformer Differential Relay (Electromagnetic/Microprocessor based).
5. To demonstrate the operation of single phasing preventer by creating single phasing fault for a given 3-ph induction motor with D.O.L. starter.
6. To test Directional Over Current Relay (DOCR) by Relay Testing Kit.
7. To simulate Alternator Protection using any simulator
8. To simulate the operation of Distance Relay using any simulator.
9. To prepare a report on specifications of lightning arresters of different manufacturers through Brochures / Literature.

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Diploma in Electrical & Electronics Engineering (Semester-VI)

DEE 6015 INDUSTRIAL AUTOMATION

OBJECTIVE

Students will be able to:

1. Know the basics of industrial automation systems.
2. Understand the principle and operation of hardware components for automation.
3. Understand industrial automation synthesis.
4. Understand the principle and operation of Electro-Pneumatic components.
5. Know about use of computers in industrial automation.

Module -I:

The industrial control system, Automation and Process Control, Purpose of Industrial Automation, Basic elements of an Automation system, Industrial Automation Circuits, Computer based Industrial control and Automation.

Module -II:

Hardware components for Automation and Process Control: Actuators: Electric Motors, Pneumatic Actuators, Micro-Electro-Mechanical-Systems, Relays, Relays' operation Principle, Power Relays, General Purpose relays, Latching Relays, Solid state relays, Electric contact classification, Solenoid Linear Actuators, Sensors: Thermal Overload Relay, Proximity switches, Photoelectric switches, Limit switches, Level Switches, Flow Switches, Temperature and flow switches, Timers, Drum Switches and special components.

Module-III:

Industrial Automation Synthesis: Introductory principles in Designing Automation Circuits, Step-by-step basic automation examples synthesis, The Meaning of the Electrical and Mechanical Latch, Automation Circuits for Motors, Automation circuits with Sensors, Automation Circuit Design Regulations, Implementation of Automation Circuits, Applications.

Module -IV:

Elements of Electro-Pneumatic Components: Introduction to Electro-Pneumatic components, Pressurized air, Production of pressurized air, distribution of pressurized air, Pneumatic devices, Pressurized air flow control valves, Circuits for Electro-Pneumatic Automation, Electro-Pneumatic applications.

Module -V:

Data Acquisition System, Data Loggers, Supervisory Control, Direct Digital Control, Distributed Control Systems.

Text Books:

1. Introduction to industrial automation- Stamatios Manesis, George Nikolakopoulos, CRC Press
2. Process Control Instrumentation Technology- Curtis D. Johnson, Prentice Hall
3. Computer Based Industrial Control- Krishna Kant, PHI

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Diploma in Electrical & Electronics Engineering (Semester-VI)

DEE 6017 NON-CONVENTIONAL ENERGY SOURCES

Module-I:

Introduction to Non-Conventional Energy Source:

Energy consumption, Energy Sources & their Availability, Importance of Non-Conventional Energy sources, Electrical Energy demand, electrical energy growth in India.

Concepts of Energy Storage & application, Mechanical Energy storage, Electrical Storage-Lead Acid Battery.

Module-II:

Solar Wind and Ocean Energy

Solar energy, its features & its applications, Photo Voltaic system(Principle, Merits and demerits), Wind energy, its mechanisms Merits, demerits & application. Introduction to ocean energy, Types of Ocean energy, Open cycle , Closed cycle.

Module-III:

Thermal & Tidal energy:

Application their features, mechanisms & applications, Understand the Geothermal & hydro thermal energy, its mechanism & applications.

Module-IV:

Hydro Electric Power Plants: Selection of site, Advantages and disadvantages of hydro power plant, Hydrology, Classification based on- Water flow regulations, Load, Head, Element of hydro power plant and their functions- Dam, Storage reservoir, Fore bay, Surge tank, Pen stocks, Spill way, Head race and tailrace, Types of turbines, Specific speed, Brief idea about small and mini hydro plants, Pumped storage plant.

Module-V:

Nuclear Power Station: Introduction and selection of site, Block diagram of plant and its working, Main components and their function, Energy mass relationship, Energy due to fission and fusion, Nuclear chain reaction, Multiplication factor and critical size, Moderators materials, Classification of Nuclear reactor, main parts and their functions, Safety measures required in nuclear plant, Disposal of nuclear waste.

Reference Books:

1. Non-Conventional Energy Sources – G D Rai, Khanna Publishers
2. Non-Conventional Energy Resources - B H Khan, 2nd Edition, Tata Mc Graw Hill Publications
3. Renewable Energy Sources & Emerging Technologies- DP Kothari, KC Singal & Rakesh Ranjan, Prentice Hall India Publication.
4. Energy opportunities and social responsibility by Satyesh C. Chakraborty Jaico publications.

UNIVERSITY POLYTECHNIC
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Diploma in Electronics Engineering (Semester-VI)

DEE 6103 ELECTRICAL INSTALLATION AND MAINTENANCE

OBJECTIVE

Student will be able to

1. Know safety measures & state safety precautions.
2. Identify / Locate common troubles in electrical machines & switch gear.
3. Test single phase, three phase transformer, DC & AC machine as per IS.
4. Plan & carry out routine & preventive maintenance.
5. Initiate total productive maintenance.

Module-I:

Safety procedure in electrical work including fire safety in building and electrical installation.

Module-II:

Introduction to installation, maintenance, location and layout, positioning of machine, foundation, leveling and alignment, grounding, find alignment, Electrical installation requirement, preventive maintenance, breakdown maintenance and maintenance schedule.

Module-III:

Earthing: Installation of different types of earthing. Testing and maintenance.

Module-IV:

Installation and maintenance of transformer, delivery, handling and inspection at site, civil work.

Module-V:

Installation and maintenance of rotating machine, delivery, handling and inspection at site, civil work.

Text and Reference Books:

1. Installation, commissioning and maintenance of electrical equipment Tarlok Singh

2. Maintenance of Electrical Equipment P.P. Gupta.

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Diploma in Electronics Engineering (Semester-VI)

DEE 6019 ELECTRIC TRACTION

OBJECTIVE

The students will be able to:

1. List and explain different equipment used in the power circuit and auxiliary circuit of electric locomotives.
2. Explain importance of maintenance of electric locomotives.
3. State and explain functioning of the protection systems used in electric locomotives.
4. Describe the resent trends in electric traction; such as, LEM propelled traction.
5. Appreciate the use of computers in electric traction management.

Module-I:

Electric Drive:

Introduction of Electric Drive, Advantages and Disadvantages of Electric Drive.

Module-II:

Traction System:

Introduction of Electric Traction, Types of Electric Traction, Ideal traction system, Various systems of traction their advantages and disadvantages, Electrification of Track their advantages and disadvantages.

Module-III:

Electrification System:

Different types of Electrification systems, Methods of supplying power to railway trains, Applications of systems for Railway Electrification.

Module-IV:

Traction Motor:

Introduction of Traction motors, Characteristics of traction motors, A. C. Series motors, Comparison between series and shunt motors with regard to other suitability for traction, Series and shunt motors for traction services, Single Phase series motors, Traction effort and Horse Power of motors problems.

Module-V:

Braking:

Introduction of Braking, Advantages and disadvantages of electric braking, types of Electric braking, Definition of plugging, Application of plugging on D. C. shunt motor, D. C. series motor. Definition of Rheostatic braking, Application of Rheostatic braking on D. C. shunt motor, D. C. series motor, Definition of Regenerative braking, Application of Regenerative braking on D. C. shunt motor, D. C. series motor.

Text book:

1. H.Partab , modern electric traction , Dhanpat Rai & Sons.

Reference Books:

2. J.Upadhyay, S.N. Mahendra , electric traction, A llied Publishers Ltd
3. Om Prakash Kesari, Viddut Engine Parichay(In Hindi) , S.P. Graphics, Nashik.