UNIVERSITY POLYTECHNIC
BIT MESRA, RANCHI

SYLLABUS

SEMESTER-III

Diploma in Electronics Engineering

UNIVERSITY POLYTECHNIC
BIT MESRA, RANCHI

Course Structure

Diploma in Electronics Engineering

Third Semester

Subject Code	Subject	Theory	Tutorial	Lab.	Credit
DMA 3201	Applied Mathematics	3	0	0	3
DEC 3101	Basic Electronics	3	1	0	4
DMM 3003	Applied Mechanics	3	0	0	3
DEC 3003	Digital Electronics	3	1	0	4
DCS 3001	C Programming	3	1	0	4
DEC 3102	Basic Electronics Lab.	0	1	2	2
DMM 3004	Applied Mechanics Lab.	0	0	2	1
DEC 3004	Digital Electronics Lab.	0	0	2	1
DCS 3002	C Programming Lab.	0	1	2	2
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**	**5**	**12**	-
	Total credits	-	-	-	**26**
	Total Periods per week	-	-	-	**32**

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Diploma in Electronics Engineering (Semester-III)

DMA3201 APPLIED MATHEMATICS

Objective: Students will be able to

1. Develop the essential skills for using Matrices and Determinant to solve system of linear equations.
2. Learn to use First order ODEs necessary for modelling engineering problems.
3. Acquire necessary ability to use Second or Higher Order ODEs to design engineering models.
4. Learn and appreciate Partial Differentiation and its applications.
5. Learn and apply Vector Calculus to solve technical problems.

Module-I:

Determinant and Matrices with Solution of System Linear Equations

Definition of a matrix of order *m* x *n* and types of matrices. Algebra of matrices such as equality, addition, subtraction, scalar multiplication, and transpose of a matrix.

Definition and expansion of determinants of order 2 and 3. Minor, cofactor of an element in a matrix, adjoint of matrix and inverse of matrix by adjoint method.

Solution of simultaneous equations containing 2 and 3 unknowns with applications.

Module-II:

Ordinary Differential Equations (ODE) of First Order

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

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-III:

Linear Differential Equations of Second and Higher Order

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

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

Module-IV:

Partial Differentiation and Multiple Integrals

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

Differentiation of composite functions. Jacobians and its properties.

Evaluation of double integral. Change of order of integration.

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

Module-V:

Vector Calculus

Definition Vector functions and its derivative. Velocity and acceleration.

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

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

Text Books:

1. N.P. Bali and Manish Goyal. "A Textbook of Engineering Mathematics". Laxmi Publications Pvt. Ltd.
2. R. S. Agarwal, "Senior Secondary School Mathematics for Class 12", Bharati Bhavan Publishers & Distributers.

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 Electronics Engineering (Semester-III)

DEC 3101 BASIC ELECTRONICS

OBJECTIVE: Student will be able to:

1. Draw and describe the basic circuits of rectifier, filter, regulator and amplifiers.
2. Read data sheets and testing of diodes and transistors.
3. Know voltage and power amplifiers.
4. Understand feedback concepts and operation of oscillators.
5. Basic understanding of FET characteristics.

Module-I:

Rectifiers and Filters: Diode as half wave, full wave and bridge rectifier. PIV, rectification efficiencies and ripple factor calculations, shunt capacitor filter, series inductor filter, LC filter and RC filter.

Introduction to Bipolar transistor and Biasing Circuits: CB, CE, CC configuration of the transistor; Input and output characteristics in CB and CE configurations; Current amplification factors. D.C load line and selection of operating point. Need for stabilization of operating point. Different types of biasing circuits.

Module-II:

Single Stage Transistor Amplifier: Single stage transistor amplifier circuit, a.c load line and its use in calculation of currents and voltage gain of a single stage amplifier circuit. H- Parameters and their significance.

Multistage Amplifiers: Need for multistage amplifier, Gain of multistage amplifier, Different types of multistage amplifier like RC coupled, transformer coupled, direct coupled, and their frequency response and bandwidth.

Module-III:

Power Amplifier: Class A, Class B, Class AB, and Class C amplifiers, collector efficiency and Distortion in class A,B,C; Single ended power amplifiers, Push-pull amplifier, and complementary symmetry push-pull amplifier

Tuned Voltage Amplifiers: Series and parallel resonant circuits and bandwidth of resonant circuits, Single and double tuned voltage amplifiers and their frequency response characteristics.

Module-IV:

Feedback in Amplifiers: Basic principles and types of feedback, Derivation of expression for gain of an amplifier employing feedback, Effect of feedback (negative) on gain, stability, distortion and bandwidth of an amplifier, RC coupled amplifier with emitter bypass capacitor, Emitter follower amplifier and its application

Sinusoidal Oscillators: Use of positive feedback, Barkhausen criterion for oscillations, Different oscillator circuits (working principles)-tuned collector, Hartley, Colpitts, phase shift, Wien's bridge, and crystal oscillator.

Module-V:

Field Effect Transistors: Construction, operation and characteristics of FET and its application. Construction, operation and characteristics of MOSFET in depletion and enhancement modes and their applications. CMOS - advantages and applications, Comparison of JFET, MOSFET and BJT - FET amplifier circuit and its working principle. (No analysis).

Text and Reference books:

1. Basic Electronics and Linear Circuit by NN Bhargava and Kulshreshta, Tata McGraw Hill, New Delhi.
2. Principles of Electrical and Electronics Engineering by VK Mehta; S Chand and Co., New Delhi
3. Electronics Devices and Circuits by Millman and Halkias; McGraw Hill.
4. Principles of Electronics by Albert Paul Malvino; Tata McGraw Hill, New Delhi
5. Electronic Principles by Sahdev, Dhanpat Rai and Sons, New Delhi.

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Diploma in Electronics Engineering (Semester-III)

DMM3003 APPLIED MECHANICS

OBJECTIVE: Student will be able to:

1. Know basic concepts about force system.
2. Learn to find the resultant of given force system.
3. Find the reactions of beam.
4. Find the centre of gravity of composite solids Find M.A., V.R.
5. Efficiency and establish law of machine.
6. To know about different laws and processes.

Module-I:

Force System Fundamentals: - Definitions of mechanics, statics and dynamics, scalar and vector, Engineering Mechanics law, principle of transmissibility, Triangle and parallelogram and polygon law, Resolution of forces, Resultant of a forces system, Moment of a force, Definition, geometrical meaning of moment of a force, classification of moments according to direction of rotation, sign convention, law of moments Varignon's theorem of moment, Couple.

Module-II:

Equilibrium: Definition, conditions of equilibrium, analytical and graphical conditions of equilibrium for concurrent, non-concurrent and parallel force system, free body and free body diagram, General condition of equilibrium, Action & reactions, Equilibrium of a particle under Three Forces.

Module-III:

Centroid and Moment of inertia: Centroid**:** Definition of centroid. Moment of an area about an axis, Centroid of basic geometrical figures such as square, rectangle, triangle, circle, semicircle and quarter circle. Centroid of composite figure, Center of gravity such as cylinder, sphere, hemisphere, cone, cube, and rectangular block , Radius of Gyration, parallel and perpendicular axis of Theorem, moment of inertia of standard forms and moment of inertia of composite Materials.

Module –IV:

Friction: Definition of friction, force of friction, limiting frictional force, coefficient of friction, angle of friction, angle of repose, relation between angle of friction angle of repose and coefficient of friction. Cone of friction, types of friction, and laws of friction, advantages and disadvantages of friction, Equilibrium of bodies on level plane external force applied horizontal and inclined up and down. Equilibrium of bodies on inclined plane.

Module –V:

Simple Machines: Definitions of simple machine, compound machine, load, effort, mechanical advantage, velocity ratio. Input on a machine, output of a machine, and efficiency of a machine, expression for mechanical advantage, velocity ratio and efficiency of a machine. Ideal machine, ideal effort and ideal load, friction in machines, effort lost in friction and frictional load. Law of machine, maximum mechanical advantage and maximum efficiency of a machine, reversibility of a machine, condition for reversibility of a machine, self-locking machine.

Text and Reference Books:

1. Engineering Mechanics by Beer – Johnson
2. Engineering Mechanics by Basu
3. Engineering Mechanics by R.K Bansal

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Diploma in 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 Electronics Engineering (Semester-III)

DCS 3001 C PROGRAMMING

OBJECTIVE:

1. To develop programming skills using the fundamentals and basics of C language.
2. To present the syntax and semantics of the "C" language as well as data types offered by the language.
3. To study the advantages of user defined data type which provides flexibility for application development.
4. To teach the basics of preprocessors available with C compiler.
5. To impart the knowledge about pointers which is the backbone of effective memory handling.

Module-I:

Programming techniques and overview of C language: Algorithm and Programming Development, Steps in development of a program. Flow charts, Algorithm development, Program Debugging, Program Structure. Formatted input, formatted output., assignment statements, Constants, variables and data types.

Module-II:

Operators and Expressions: Arithmetic, Relational, Increment, increment, 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: 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 and Reference Books:-

1. E Balagurusamy, "Programming in ANSI C" Tata McGraw-Hill, New Delhi.
2. Ashok N. Kamthane, "Programming in C" Pearson Education India, New Delhi.

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Diploma in Electronics Engineering (Semester-III)

DEC3102 BASIC 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

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Diploma in Electronics Engineering (Semester-III)

DMM 3004 APPLIED MECHANICS LAB.

List of Experiments:

1. To verify the Polygon Law of Forces, with the help of force polygon apparatus.
2. To verify the parallelogram law of forces.
3. To study Lami's theorem using universal force table apparatus.
4. To verify the forces in the different members of a jib crane.
5. To find out centre of gravity of regular laminas.
6. To find out centre of gravity of irregular laminas.
7. To find moment of inertia of flywheel.
8. Comparison of coefficient of friction of various pairs of surfaces & determination of angle of repose.
9. To find the mechanical advantage, velocity ratio and efficiency in the case of Screw Jack.
10. Deflections of a truss-horizontal deflections & vertical deflections of various joints of a pin-jointed truss.
11. To find the mechanical advantage, velocity ratio and efficiency in the case of Winch Crab Single Graphical Representation.
12. To study the performance of differential axle and wheel and find its velocity ratio, efficiency and law of machine.

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Diploma in Electronics Engineering (Semester-III)

DEC3004 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 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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Diploma in 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. equipments 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

Diploma in Electronics Engineering

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Course Structure

Diploma in Electronics Engineering

Fourth Semester

Subject Code	Subject	Theory	Tutorial	Lab.	Credit
DEC 4011	Electronic Instruments and Measurement	3	0	0	3
DEC 4013	Analog Communication	3	1	0	4
DEC 4015	Linear Integrated Circuit	3	0	0	3
DEC 4017	Microprocessor and Its Applications	3	1	0	4
DAC 4001	Environmental Science	2	0	0	2
DEC 4012	Electronic Instruments & Measurement Lab.	0	0	2	1
DEC 4014	Analog Communication Lab.	0	0	2	1
DEC 4016	Linear Integrated Circuit Lab.	0	0	2	1
DEC 4018	Microprocessor Lab.	0	1	2	2
DCS 4012	Visual Basic Lab.	0	0	2	1
DHU 4002	Professional Practices-III	0	0	2	1
	Periods per week	**14**	**3**	**12**	-
	Total credits	-	-	-	**23**
	Total Periods per week	-	-	-	**29**

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Diploma in Electronics Engineering (Semester-IV)

DEC4011 ELECTRONIC INSTRUMENTS AND MEASUREMENTS

OBJECTIVE: Student will be able to:

1. Know the construction of the instruments.
2. Understand the principles and operation of different measuring instruments.
3. Selecting the appropriate instrument for measurement.
4. Observing reading and interpreting the values from different meters.
5. Learning the precautions& applications of the instruments.
6. Reading the specifications from datasheets.

Module-I:

Measurement and Measurement System: Performance characteristics of measurement- static and dynamic, Error and types of error, Noise, signal to noise ratio, noise figure, noise factor, Bridges- Whetstone's Bridge, Kelvin's Bridge, Maxwell's Bridge, Wien's Bridge.

Module-II:

Digital instruments, digital voltmeters, digital multimeter, digital frequency meter, X-Y recorder, plotters, Digital waveform recorder/analyzer, spectrum analyzer, digital spectrum analyzer.

Module-III:

Cathode Ray Oscilloscopes: Introduction, CRT, Measurement of voltage and frequency using CRO, Digital Storage Oscilloscopes, DSO applications. (5)

Module-IV:

Transducers: Types, factors affecting selection of transducers, Principles of Resistive, Inductive and capacitive transducer, LVDT, Thermocouple, Thermistor, RTD, Piezoelectric, opto-electronic (Photo electric) transducers, strain gauge, gauge factor (7)

Module-V:

Data Acquisition and conversion: Analog signal processing, sample and hold operation, S/H circuits using OP-Amps, Data Acquisition System, Data Logger, Instrumentation amplifier, isolation amplifier, IEEE-488 GPIB Bus (6)

Text and Reference books:

1. Electronic Instrumentation & Measurement by David A Bell, Oxford University Press.
2. Electronic Instruments by Kalsi, Tata Mc Grow Hill,
3. Electrical & Electronic Measurements & Instrumentations by A.K. Sawhney, Dhanpat Rai & Co.
4. Student Reference Manual for Electronic Instrumentation laboratory by Stanley Wolf & Richard Smith, Prentice Hall.

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Diploma in Electronics Engineering (Semester-IV)

DEC4013 ANALOG COMMUNICATIONS

OBJECTIVE: Student will be able to know:

1. About basics of signals needs of modulation and multiplexing techniques.
2. about the noise, types of noise and significance of noise equivalent band width.
3. about methods of modulation and demodulation of AM and DSB-SC signal.
4. about methods of generation of SSB, VSB and their demodulation along with advantages and disadvantages.
5. about angle modulation, modulation and demodulation methods of FM wave, concept of pre-emphasis and de-emphasis and comparison between AN, FM and PM.

Module-I:

Communication Of Signals And Transmission Media -The communication process, sources of Information, Message and signals, classification of signals, elements of a communication system, Modulation, needs of modulation, Radio frequency spectrum, Types of transmission Media, Transmission Multiplexing schemes.

Module-II:

Noise and Their Classification-Classification and origin of noise, thermal noise, white noise, shot Noise, noise equivalent bandwidth, noise temperature, signal in presence of noise, signal to noise ratio (SNR), noise figure, noise temperature, noise figure.

Module-III:

AM Transmitter and Receivers - Generation of AM wave, low level and high level modulation, AM transmitter block diagram, Modulation and Demodulation of AM Waves. DSB-SC modulation, Generation of DSB-SC signals, Demodulation of DSB-SC signals.
Tuned radio frequency (TRF) receiver, Super heterodyne receiver, Receiver parameters: sensitivity, selectivity, fidelity, tracking, image frequency and its rejection, IF amplifiers.

Module-IV:

SSB Transmitters and Receivers - Generator of SSB: filter method, phase shift method.
Demodulation of SSB: coherent detection method, advantages of SSB over DSB-FC.
Vestigial sideband transmission (VSB): advantages, Generation and Demodulation of VSB.

Module-V:

FM Transmitter and Receivers -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, Comparison between AM, FM & PM.

Text and Reference books:

1. Communication Systems, S. Haykin
2. Communication Systems, R. P. Singh
3. Analog Communication Systems, Sanjay Sharma, S.K. Kataria & Sons
4. Communication Systems, 1st Edition, R. P. Singh, Sosapre.
5. Modern Digital & Analog Communication System, 3rd Edition, B.P. Lathi
6. Electronic Communication Systems, 4th Edition Kennedy – Davis.

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Diploma in Electronics Engineering (Semester-IV)

DEC4015 LINEAR INTEGRATED CIRCUITS

OBJECTIVE: Student will be able to:

1. Define the Op-amp characteristics and describe working principle of OPAMP.
2. State features and advantages of integrated circuits.
3. Design electronic circuit using OPAMP for various mathematical operation.
4. Design electronic circuit using OPAMP for industrial application.
5. Design electronic circuit using timer IC's.7. Analyze the response of frequency selective circuit such as PLL with respect to the incoming signal.

Module-I:

Introduction to Operational Amplifier (OPAMP): Block diagram and functions (all stages), Equivalent Circuit, Circuit Symbols and Terminals, OPAMP IC's: 741 pin diagram and pin function. Definitions of parameters of op-amp- Input offset voltage, Input offset current, Input bias current, differential input resistance, Input capacitance, Input voltage range, offset voltage adjustment, CMMR, SVRR, large signal voltage gain, supply voltages, supply current, output voltage swing, output resistance, slew rate, gain bandwidth product, output short circuit current. Ideal op-amp: electrical characteristics.

Module-II:

OPAMP basic circuits: Open loop and closed loop configuration of op-amp, its comparison, Virtual ground concept Open loop configuration – Inverting , Non-inverting, Close loop configuration– Inverting, non- inverting, differential amplifier, unity gain- amplifier(voltage follower), inverter(sign changer), Inverting & non-inverting configuration of Adders (summing amplifier, scaling Amplifier, averaging amplifier), Subtractor, Basic and Practical Integrator, Basic and Practical Differentiator, Basic concept of frequency compensation of op- amp and offset nulling, Numerical based on designing of above circuit.

Module-III:

Applications of OPAMP: Need for signal conditioning and signal processing. Circuit diagram, operation, derivation of output voltage equation, advantages and applications of Instrumentation amplifier (using one two and three op-amps). Pin diagram pin functions and specifications of IC AD 524, LM 324 voltage to current converter (with floating load, with grounded load). Current to voltage converter, Sample and hold circuit (IC LF398 , Pin diagram specification and pin functions) Logarithmic and antilogarithmic amplifiers (using Diodes) Analog divider and analog multiplier, Concept of comparator: Comparators (ICLM301, LM310, 710 Pin diagram specification and pin functions).

Module-IV:

Filters: Introduction to filters, Classification of filters, Concept of passive & active filters, Merits & demerits of active filters over passive filters, Ideal and actual characteristics, terms: - cut off frequency, pass band, stop band, center frequency, roll off rate, BW, Q- factor, first order & second order Butterworth filters, Low pass filter, high pass filter, band pass filter(wide band pass , narrow band pass filter) Band reject filter(wide band reject, narrow band reject filter), all pass filter, Numerical based on design of different filters.

Module-V:

Timers: Introduction to timer IC 555, Block diagram of IC 555 and its pin diagram & function of each pin, Concepts of different timer circuits used in industries: water level controller, Touch plate switch, frequency divider etc., IC 556 pin diagram and specifications. Designing of simple circuits and trouble shooting of these circuits, Numerical based on timers, Principle of operation, block diagram of PLL, Applications of PLL as frequency multiplier, FM demodulator, Pin diagram and pin functions of IC 565(PLL) and IC 566(VCO).

Text and Reference books:

1. Op-Amp & Linear Integrated Circuits by Ramakant A Gaikwad, Prentice-hall of India New Delhi.
2. Operational Amplifier with Linear Integrated Circuits by William D. Stanley, Pearson Education.
3. Design with OPAMP & analog integrated Circuits by Sergio Franco, Tata McGraw-Hill, New Delhi.

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Diploma in Electronics Engineering (Semester-IV)

DEC4017 MICROPROCESSOR AND ITS APPLICATION

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 and Reference books:

1. Fundamentals of Microprocessors & Microcontrollers – By – B. Ram
2. Digital Computer Electronics – By – Malvino, Brown.
3. Microprocessor Architecture, Programming & Applications – By – R.S.Gaonkar.

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Diploma in Electronics Engineering (Semester-IV)

DAC 4001ENVIRONMENTAL SCIENCE

OBJECTIVE:

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, portability 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:

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

Text and Reference books:

1. Environmental Chemistry – A. K. Dey
2. A basic course in Environmental studies - Deswal & Deswal
3. Environmental pollution – B. K. Sharma
4. Environmental pollution and control - C. S. Rao
5. Essentials of ecology & environmental Sciences - S.V.S. Rana

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Diploma in Electronics Engineering (Semester-IV)

DEC4012 ELECTRONIC INSTRUMENT AND MEASUREMENT LAB.

List of experiments:

1. Study of CRO
2. Study of Function Generator
3. Measurement of Voltage and Frequency using CRO
4. Measurement of R, L and C using LCRQ meter
5. Measurement of resistance using Wheatstone Bridge
6. Measurement of low value resistance using Kelvin Bridge
7. To determine characteristics of Photovoltaic cell
8. To determine characteristics of Photoconductive cell
9. To determine characteristics of IC temperature sensor
10. To determine characteristics of Platinum RTD
11. Measurement of Capacitance using Wien's Bridge
12. Measurement of Inductance using Maxwell's Bridge

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Diploma in Electronics Engineering (Semester-IV)

DEC4014 ANALOG COMMUNICATIONS LAB.

List of experiments:

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

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Diploma in Electronics Engineering (Semester-IV)

DEC4016 LINEAR INTEGRATED CIRCUIT LAB.

List of experiments

1. Measurement of parameters of IC 741 (such as CMRR , SVRR, offset adjustment)
2. To assemble inverting and non-inverting amplifier and draw input output wave forms.
3. To assemble addition and subtraction of analog signal using OPAMP.
4. Observe output of active integrator for different types of input (sine and square)
5. Observe output of active differentiator for different types of input (sine and square)
6. Plot the graph of input and output for V to I converter and I to V converter
7. To assemble logarithmic and antilogarithmic amplifier and verify its output.
8. To assemble zero crossing detector and active peak detector.
9. To assemble and plot the output waveform for astable multivibrator, voltage control oscillator using IC 555.
10. To assemble and plot the output waveform for bistable multivibrator and schmitt trigger using IC 555.
11. Design monostable multivibrator using IC 555 and troublshoot.
12. Plot the frequency response of second order butterworth low pass filter.
13. Plot the frequency response of second order butterworth high pass filter.
14. Plot the frequency response of first order butterworth band pass filter/ band reject filter.

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Diploma in 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 Electronics Engineering (Semester-IV)

DCS 4012 VISUAL BASIC LAB.

OBJECTIVE:

1. Develop acquaintance with standard VB controls.
2. Developing understanding of various controls and mathematical functions.
3. Understanding various inbuilt functions.
4. Using control statements in VB.
5. Database connectivity and report generation.

1. **Visual basic building blocks:**
   - Object, properties, events, forms, controls, modules, methods, input box and message box.
   - Form: Creating adding and removing forms in project: Add, remove, hide, show, load statement, unload statement, me keyword, Referring to objects on a different forms.
   - Data types, Variable, constant
2. **Working with Controls:**
   - Text box, label, command button, frame, list box, check box, radio button, file list box, drive list box, directory list box, timer, scroll bar control, picture box, image box, Menu editor.
3. **Inbuilt functions:**

   Mathematical function: Rnd, Sqr, Int, Abs, Exp, Log, Sin, Cos, Tan , Atn, Fix and Round.

   Format function and String: Tab, Space, and Format, String comparison: equals, compareto.
4. **Control statements:**

   If ……then, If…….then……else, If…….then……elseif…end if

   Looping: for….next, while…wend, do….while, do….until.

   Compound conditions: And , Or, Not; Select Case
5. **Database connecting tools:**

   ADODC, ADODB, Creating the database files for use by visual basic(using MS- Access), Data control and their properties, Adding a New Record, searching record, Updating a record, Deleting a record, Data grid

   Report generation: Data environment, creating query, preparing a report.

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Diploma in 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. The field visits may be arranged in the following areas / industries:
Electronic Equipment Manufacturing unit, Resistance Welding unit, Industrial Automation unit.

Module-II:

Lectures by Professional / Industrial Expert:(any four fields)
Cyber laws, Fiber optics communication system, Disaster management,Use of signals for Telephone, television, internet, Industrial Safety, Computer security systems, any other suitable topic.

Module-III:

Information Search : Information search can be done through manufacturers, catalogue, internet, magazines; books etc. and submit a report. Following topics are suggested: Collection of information about tools used in electronic workshop, Market survey for motors used in electronic application, Non-Conventional Energy Sources with focus on solar energy, Elevators installation and maintenance, any other suitable areas.

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:

Maintenance of Electronic Equipment: Reliability Factors of equipments, Maintenance Management, Troubleshooting Procedures, Troubleshooting Aids.

Text and Reference books:

1. Electronic Instruments & System by R.G. Gupta, Tata MacGraw Hill.
2. Trouble Shooting Electronic Equipment by R.S. Khandpar, Tata MacGraw Hill.

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SYLLABUS

SEMESTER-V

Diploma in Electronics Engineering

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Course Structure

Diploma in Electronics Engineering

Fifth Semester

Subject Code	Subject	Theory	Tutorial	Lab.	Credit
DEC 5009	Digital Communication	3	1	0	4
DEC 5011	Embedded System	3	1	0	4
DEC 5013	Advance Communication Systems	3	0	0	3
DEC 5015	Control Systems	3	1	0	4
DEC 5010	Digital Communication Lab.	0	1	2	2
DEC 5014	Embedded System Lab.	0	0	2	1
DEC 5016	Advance Communication Systems Lab.	0	1	2	2
DEC 5018	Control Systems Lab.	0	0	2	1
DEC 5012	Project-I	0	0	4	2
	Periods per week	**12**	**5**	**12**	-
	Total credits	-	-	-	**23**
	Total Periods per week	-	-	-	**29**

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Diploma in Electronics Engineering (Semester-V)

DEC 5009 DIGITAL COMMUNICATIONS

OBJECTIVE: Student will be able to:

1. Compare analog communication system with digital communication system.
2. Define channel capacity and entropy and explain sampling theorem.
3. Compare and describe PAM, PWM, PPM, PCM, DM, ADM and DPCM.
4. Draw block of PSK transmitter & receiver, QFSK, QAM DP. Compare ASK, FSK, PSK.
5. Describe the various types of coding methods & error detection and correction.
6. Explain the need and types of multiplexing.

Module-I:

Introduction Of Digital Communication: Basic digital communication system, block diagram, 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-II:

Pulse Communication: Introduction, comparison with Continuous Wave Modulation, advantages, Sampling theorem, Nyquist rate, aliasing, natural & flat top sampling, PAM, PWM, PPM definition, generation, block diagram, waveform analysis, and their comparison, Pulse code modulation- block diagram of PCM transmitter & receiver, sampling quantization, quantization error, companding, inter symbol interference, Delta modulation- block diagram of DM, slope overload, granular noise, ADM, DPCM, block diagram and working.

Module-III:

Digital Modulation Techniques: ASK, FSK, PSK definition & waveforms, their transmitter and receiver block diagram and working, M-ary encoding, QPSK, QAM, DPSK block diagram of transmitter and receiver and working, Bandwidth for each modulation technique and their comparison.

Module-IV:

Coding Methods And Error Control: Baud rate, Bit rate, Line coding - unipolar, bipolar – NRZ, RZ, Manchester, Source coding, ASCII, EBCDIC and baudot code, Channel coding, Error, Causes of error and its effects, error detection & correction using parity, Hamming code & simple numerical.

Module-V:

Multiplexing And Multiple Accesses: Need of Multiplexing, TDM, FDM definition block diagram and their comparison, Introduction to WDM, Access technique TDMA, FDMA, CDMA (only concepts), advantages of TDMA over FDMA. Introduction to spread spectrum modulation.

Text & References books

1. Electronic Communication System, Wayne Tomasi, Pearson Education
2. Digital Communication, Amitabha Bhattacharya, Tata McGraw Hill
3. Digital & Analog Communication, K. Sam. & Shanmugar, Jhon wiley & sons
4. Digital Communication Fundamentals & Applications, B. Sklar, Pearson Education

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Diploma in 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)

DEC 5013 ADVANCE COMMUNICATION SYSTEMS

OBJECTIVE: Student will be able to:

1. Recognize different communication system.
2. Learn the Concept of electromagnetic wave.
3. Identify Microwave spectrum (frequency).
4. Identify different wave guide components.
5. State the Properties of different Tee.
6. State the Concept of duplexer.

Module-I:

Wave Guide: Microwave Region and Band Designations, Introduction to TEM/TE/TM/HE wave destination, Comparison of wave guide with two wire transmission line, Propagation of waves in rectangular wave guide only.(Introduction to wave guide only), TE & TM Modes in rectangular wave guide with field pattern. Concept of dominant mode, Definition and interpretation of cut off frequency of a waveguide, guide wave length, phase velocity, group velocity(Simple Numerical).

Module-II:

Microwave Components: Construction , working Principles & Applications of : Multicavity klystron amplifier, Reflex Klystron amplifier, Travelling wave tube, Magnetron, Construction working principle & Application, PIN Diode &Gunn Diode; Construction, Working principle & application of H-plane Tee, E-Plane Tee, E-H Plane TEE, Multihole directional coupler, wave guide, bends, corners, Twists, circulator, Isolator.

Module-III:

Microwave Communication Systems: Microwave Communication, Mode of Wave Propagation, Range of LOS Microwave Systems, Concept of Effective Earth's Radius, Duct Propagation (Super Refraction), Microwave Antennas.

Module-IV:

Radar Theory: Fundamentals: Basic concept of Radar, Radar Range equation, factors influencing maximum range, Block diagram of an elementary pulsed Radar, Duplexer concept, Antenna & Scanning (Antenna Scanning & Tracking), display methods. Principle of MTI Radar, Block diagram and explain the operation of MTI radar, Concept of continuous Wave Radar (Modulated & Un-Modulated), Doppler effect. Advantages, Disadvantage and application of CWR. Radar Beacons.

Module-V:

Satellite Communication: Block diagram of elements of a satellite Communication system, Orbital pattern of Satellite (Elliptical orbit, Parabolic orbitand geo stationary orbit), Advantages of geo stationary satellite, Satellite links (uplink, down link, cross link), look angle, angle of elevation, azimuth angles, Uplink and downlink frequency bands used in satellite Communication, foot print and station keeping, Block diagram of Satellite earth stationary, Block diagram of satellite subsystems, Functions of a satellite -Power subsystem (only concept), Solar ECLIPSE; Telemetry, tracking & Command; Altitude & Orbit Control System. Communication Channel subsystem (Block diagram of typical transponder).

Text and Reference books:

1. Microwave Devices and Circuits by Samuel Liao, Prentice Hall of India
2. Microwave and Radar Engineering by A K Gautam, S. K. Kataria & Sons
3. Microwave Engineering by David Pozar, John Wiley and Sons.

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Diploma in 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 Electronics Engineering (Semester-V)

DEC 5010 DIGITAL COMMUNICATIONS LAB.

List of experiments:

1. Observe the signal sampling and reconstruct techniques
2. Observe the effect on reconstructed wave form using sample / hold circuit.
3. To compare the frequency response of 2^{nd} order and 4^{th} order of LPF.
4. Observe waveforms of Pulse Amplitude modulation and demodulation.
5. Observe waveforms of Pulse width modulation (using natural sampling & flat top sampling)
6. Observe waveforms of Pulse Position modulation (using natural sampling.
7. Observe waveforms of Pulse code modulation and demodulation.
8. Observe waveforms of Delta modulation.
9. Observe waveforms of Adaptive delta Modulation.
10. Observe waveforms of ASK modulation & demodulation.
11. Observe waveforms of FSK modulation & demodulation.
12. Observe waveforms of PSK modulation & demodulation.

Optional

1. Observe waveforms of QPSK modulation & demodulation.
2. Observe waveforms of QAM modulation & demodulation.
3. Error detection & correction using parity bits.
4. Error detection & correction using hamming codes
5. To generate following different line codes and decode them.

    a. NRZ (Unipolar) b. Bipolar NRZ c. RZ (Unipolar) d. Bipolar RZ

6. Time division multiplexing/ de multiplexing system.
7. Frequency division multiplexing/ de multiplexing system.

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Diploma in 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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Diploma in Electronics Engineering (Semester-V)

DEC 5016 ADVANCE COMMUNICATION SYSTEMS LAB.

List of experiments:

1. Verify the characteristics of Reflex Klystron.
2. Verification of characteristics E Plane Tee.
3. Verification of characteristics of Isolator.
4. Verification of characteristics of Circulator.
5. Indirect measurement of frequency using cavity resonator.
6. Measure the coupling factor of MHD Coupler.
7. Verification of the square law characteristics of a VHF crystal oscillator
8. V-I Characteristics of a Gunn Diode.
9. Determination of gain of a pyramidal Horn Antenna.
10. Determination of waveguide characteristics of X-Band Rectangular Waveguide.
11. Determination of Transmission Line Parameters.

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Diploma in Electronics Engineering (Semester-V)

DEC 5018 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

SYLLABUS

SEMESTER-VI

Diploma in Electronics Engineering

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Course Structure
Diploma in Electronics Engineering

Sixth Semester

Subject Code	Subject	Theory	Tutorial	Lab,	Credit
DMT 6001	Total Quality Management	3	0	0	3
DEC 6009	Industrial Instrumentation	3	0	0	3
DCS 6003	Computer Hardware	3	1	0	4
DCS 6007	Computer Networks and Security	3	0	0	3
	Elective-I	3	0	0	3
	Elective-II	3	0	0	3
DEC 6014	Industrial Instrumentation Lab,	0	0	2	1
DCS 6004	Computer Hardware Lab,	0	0	2	1
DCS 6008	Computer Networking Lab,	0	0	2	1
DEC 6012	Project-II	0	0	6	3
List of Elective-I(Any one)					
DEC 6011	Wireless and Mobile Communication	3	0	0	3
DEC 6013	Telematics	3	0	0	3
DME 6015	Mechatronics	3	0	0	3
DEC 6015	VLSI Design	3	0	0	3
List of Elective-II(Any one)					
DEC 6017	Medical Electronics	3	0	0	3
DEC 6103	Optical Fibre Communication	3	0	0	3
DCS 6017	Internet of Things	3	0	0	3
	Periods per week	**18**	**1**	**12**	**-**
	Total credits	**-**	**-**	**-**	**25**
	Total Periods per week	-	-	-	**31s**

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Diploma in 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,Pricnciples & 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.

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Diploma in Electronics Engineering (Semester-VI)

DEC6009 INDUSTRIAL INSTRUMENTATION

OBJECTIVE: Student will be able to:

1. Explain the construction and working of instruments which control the various parameters and operations in any industry,
2. Diagnose faults, rectify them,
3. Test the total system for good performance,
4. Design, modify and troubleshoot PLC based control circuits,
5. Understand and identify the elements of control in instruments,

Module-I:

Transducers: Introduction, Definition and nature, Transducer functions, Characteristics of transducers, Transducer classification, Displacement / Motion transducer, Temperature transducers, Pressure transducers, Liquid level transducers, Intelligent sensors, Bio Sensors.

Module-II:

Recent developments in instrumentation and measurements: Computer-aided measurements, Fiber optic transducers, Microsensors, Smart Sensors, Smart transmitters and Field Bus, Virtual Instrumentation.

Module-III:

Final Control Element: Introduction**,** Pneumatic actuation, Hydraullic actuation, Electric Actuation, Motor Actuators, Control Valves.

Converters: I/P converter, P/I Converter.

Module-IV:

Programmable Logic Controllers: Introduction to Microcomputers, Programmable controllers, Programmable Logic Controllers, PLC programming, Ladder diagram, PLC Communications and Networking, PLC selection, PLC installation, Advantages of using PLC.

Module-V:

Distributed Control System: Introduction, Overview of distributed control, DCS Software configuration, DCS Communication, DCS Supervisory Computer tasks, DCS Integration with PLCs and Computers, Features of DCS, Advantages of DCS.

Text and Reference books:

1. Computer based industrial control by Krishnakant
2. Instrumentation Measurement and Analysis by BC Nakra and K K Chaudhry
3. Industrial Instrumentation and Control by S, K, Singh

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Diploma in 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 and Reference book:

1. Ron Gilster, "PC Hardware: A Beginner's Guide", TMH
2. C.A.Schmidt, "The Complete Computer Repair Textbook", 3e, Dreamtech
3. David Groth, "A+ Complete Study Guide", 3e

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Diploma in Electronics Engineering (Semester-VI)

DCS 6007 COMPUTER NETWORKING & SECURITY

OBJECTIVE:

1. Understand basics elements of Network.
2. Develop understanding of OSI and TCP/IP model, role of Physical and Data link layers in communication.
3. Develop understanding of various algorithms and protocols used at Network layer.
4. Understanding role of Transport and Application layer in communication.
5. Understand basics of various technologies used to ensure security during communication.

Module-I:

Network Fundamentals:

Network Topology: Bus, Ring, Star, Mesh; Network devices: Ethernet card, Hub, Switch, Bridge, Router; Addressing: Physical address, Logical address, Classes of IP address, Subnet Mask; Terminology: unicasting, multicasting, broadcasting, broadband, point-to-point, multipoint.

Module-II:

Overview of OSI & TCP/IP model, Physical & Data link layer:

Overview of OSI & TCP/IP model; Physical Layer: role of physical layer, switching.
Transmission modes: Simplex, Half duplex, full duplex; Data Link Layer: Data link layer design issues, Error detection and correction, elementary data link layer protocols, sliding window protocol; media access control sub-layer.

Module III:

Network layer:

Network Layer Design issues, overview of Routing Algorithms, overview of Congestion Control Algorithms, Internetworking, role of the Network Layer in the Internet.

Module IV:

Transport and Application layer: Elements of Transport Protocols, Simple Transport Protocol, UDP & TCP protocol. Application Layer: DNS—The Domain Name System, Electronic Mail, The World Wide Web, Multimedia.

Module V:

Network Security: Cryptography, Symmetric-Key Algorithms, Public-Key Algorithms, Digital Signatures, Management of Public Keys, Communication Security, Authentication Protocols,
E-Mail Security, Web Security, Social issues.

Text and Reference Book:

1. Andrew S. Tanenbaum, “Computer Networks”, 4e, PHI
2. B.A. Forouzan, “Data Communication and Networking”. 4e, TMH
3. Stallings. W., "Data and Computer Communication", 6e, PHI.

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Diploma in Electronics Engineering (Semester-VI)

DEC6014 INDUSTRIAL INSTRUMENTATION LAB.

List of experiments:

1. Measurement of displacement using LVDT
2. Measurement of weight using Strain gauge trainer
3. To determine characteristics of PIN Photodiode
4. To determine characteristics of Phototransistor
5. To determine characteristics of Platinum RTD
6. To determine characteristics of NTC Thermistor
7. To determine characteristics of K type Thermocouple
8. Introduction to ladder programming & to implement basic logic gates
9. Develop, Simulate and Test Ladder diagram for Door Bell Operation
10. Develop, Simulate and Test Ladder diagram for Bottle Filling system
11. Develop, Simulate and Test Ladder diagram for Traffic Light Control System
12. Develop, Simulate and Test Ladder diagram for Car Parking System
13. Develop, Simulate and Test Ladder diagram for an alarm enunciator system
14. Develop, Simulate and Test Ladder diagram for Batch Mixer
15. Develop, Simulate and Test Ladder diagram for Drink Dispenser System
16. Develop and test PLC program for three phase motor in both direction
17. Develop, Simulate and Test Ladder Diagram for stepper motor control in forward and reverse direction.
18. Develop, Simulate and Test Ladder diagram for an Elevator system.

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Diploma in Electronics Engineering (Semester-VI)

DCS 6004 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 Electronics Engineering (Semester-VI)

DCS 6008 COMPUTER NETWORKING & SECURITY LAB.

List of Experiments

1. Identification of various network components/devices e.g. Connectors, Hub, Switch, Modem
2. Preparation of cross and parallel cable.
3. Setting IP address.
4. Using command line diagnostics: ipconfig and ping.
5. Setting-up of small home/office network:
    a. Connecting PCs in a network.
    b. Configuring PCs in a network.
    c. Creating workgroup.
6. File and print sharing
    a. Setting-up file sharing options (read/write/full control).
    b. Setting-up print sharing options.
    c. Installation of network printer.
7. Configuring and managing computer security
    a. Account lockout
    b. Password policy
    c. Audit policy
    d. User Rights Assignment
    e. Security Options
8. Setting-up of Remote desktop services
9. Netmeeting:
    a. Installation of Netmeeting
    b. Sharing of files on Netmeeting
    c. Desktop sharing
    d. Shared white board
10. Setting-up remote assistance.
11. Installation of server Operating system.
12. Installation of Active directory.
13. Configuring access permissions.
14. Installation & configuration of TCS(Terminal Client Services)
15. Quota Management
16. Managing user accounts
    a. Creating user accounts
    b. Making a user account member of Administrative group.
    c. Assigning permissions

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Diploma in Electronics Engineering (Semester-VI)

DEC6011 WIRELESS AND MOBILE COMMUNICATION (ELECTIVE – I)

OBJECTIVE: Student will be able to:

1. Compare operation of different mobile communication system
2. Describe cellular concept such as frequency reuse, hand off; coverage & capacity
3. Draw GSM system architecture and Explain call processing in GSM
4. Explain CDMA (IS-95) standards and Explain Call processing in CDMA
5. Compare GSM & CDMA
6. Define SS7 services

Module-I:

Introduction to wireless communication system: Evolution of mobile radio communication, Mobile radio system around the world, Related definition, base station, control channel, forward channel etc, Examples of wireless communication system such as paging system, cordless telephone system, cellular telephone system, how cellular telephone call is made.

Module-II:

Mobile unit: Block Diagram and operation of mobile unit, Block Diagram & Explanation of frequency synthesizer, Block diagram and operation of transmitter, receiver, logic unit, control unit & handset.

Module-III:

The cellular concept: Introduction to cellular concept, Introduction to basic cellular system, Frequency reuse, Hand off, Type of hand off, Interference & system capacity, Co channel interference & system capacity, Channel planning for wireless system, Adjacent channel Interference, Improving coverage and capacity in cellular system, Cell splitting, Sectoring, Repeater for range extension, Micro cell zone concept.

Module-IV:

Digital cellular mobile systems: G.S.M system architecture, G.S.M services & features, G.S.M radio subsystems, G.S.M channel types, Message & call processing in GSM, Privacy & security in GSM, Signal system no.7 (ss7)—performance services, CDMA digital cellular standard IS-95, IS.95 frequency & channel specification, IS.95 channel structure, Forward & Reverse channel modulation process, IS-95 system architecture.

Module-V:

Modern wireless communication system: 3GW-CDMA (UMTS) (Universal mobile Telecommunication system.), 3G CDMA 2000, 3G- TD-SCDMA (synchronous), Wireless local loop & LMDS (local multipoint distribution), IMT 2000.

Text and Reference books:

1. Wireless Communication: Principles & Practice by T.S. Rappaport, Pearson Education
2. Mobile Cellular Telecommunication by William Lee, Tata McGraw Hill
3. Mobile & Personal communication services& system by Raj Pandya Prentice Hall of India.

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Diploma in Electronics Engineering (Semester-VI)

DEC6013 TELEMATICS (ELECTIVE – I)

OBJECTIVE: Student will be able to:

1. Identify different sections of telephone receiver and different tones used in telephone exchange.
2. Describe operation of cordless telephone.
3. Explain different digital switching system and analog and digital services.
4. Explain Principle and services provided by ISDN.
5. Install EPABX system.
6. Explain the operation of FAX and modem.

Module-I:

Telephone Instrument and signals: Introduction, Telephone receiver, Block diagram & operation of electronic telephone, Tones used in telephone exchange dial tones, busy tone, ring tone, number unobtainable tone, Touch tone (DTMF), Block diagram of cordless telephone system, Frequency allocation.

Module-II:

Digital Switching System: Introduction, Classification of switching system, Telecommunication network – trunks, subscriber lines, Basic of switching system.- Inlets, outlets symmetric network, folded network, blocking network, non-blocking network, Elements of Switching system, SPC (Stored program control),Centralize SPC, Distributed SPC, Enhanced services, Telephone Network, Subscribers loop system – MDF,MF, FP, BF,DP,DC,DW, Switching Hierarchy routing, Numbering plan- Telephone number.

Module-III:

Analog, Digital Services and Applications of Telecommunication.(only informative treatment): Analog services – Switched, leased, local call service, Toll call services, 800 services, WATs, 900 services, Digital services- switched / 56, Digital data service (DDS), Digital signal services (DS), Digital subscriber line (DSL) – ADSL, Business applications of telecommunication, Automated teller machines(ATM), Videoconferencing, Banking, Shopping, Telecommuting, Distance Learning, Telemedicine.

Module-IV:

ISDN: Motivation for ISDN, Services provide by ISDN, X. 400 family of standards, Architecture of ISDN, ISDN rate access interface, Primary rate access (PRI) interface, Basic rate access (BRI) interface, Message format for ISDN, ISDN address structure, Broad band ISDN, Introduction to FAX, Working principle of FAX, Image processing, Data compression, Block diagram & operation of FAX machine, Introduction to Modem, Working principle of Modem, Types of Modem- Synchronous, Asynchronous, half duplex & full duplex, Block schematic of Modem, ADSL & cable Modem.

Module-V:

Telephone Instrument (DTMF): Tone Type, MF, Wireless Telephone, ISDN Installation, ISDN Procedure, ISDN telephone, Conferencing, Internet

EPABX (Electronic private automatic business exchange): Block diagram, Signal Processing, Analog CMOS cross point switch, Digital TDM / PCM switch, Installation procedure for EPABX, Programming on Console, on terminal, on computer, Maintenance technique, Voice Over IP Phone, Wiring Diagram.

Text and Reference books:

1. Telecommunication switching systems and networks by T. Vishwanathan, Prentice Hall of India.
2. Principle of Telephony by N.N Biswas, Radiant Books
3. Management of Telecommunication by H. Carr and C. Snyder, Tata McGraw-Hill.

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Diploma in Electronics Engineering (Semester-VI)

DME6015 MECHATRONICS (ELECTIVE – I)

OBJECTIVE: Student will be able to:

1. Identify various input and output devices in an automated system.
2. Understand and draw ladder diagrams.
3. Write simple programs for PLCs.
4. Interpret and use operations manual of a PLC manufacturer.
5. Use simulation software provided with the PLC.
6. Understand interfacing of input and output devices

Module-I:

Introduction and Mechatronics elements: Definition of mechatronics. Mechatronics in manufacturing, products and design. Review of fundamentals of electronics. Introduction to Sensors, Transducers and Actuators Principle, working and applications of-Limit switches, proximity switches like inductive ,capacitive and optical (deflecting and through beam type) , Thumb wheel Switches magnetic reed switches , Optical encoders-displacement measurement, rotary, incremental, opto-couplers. Actuator – solenoids – on-off applications, latching, triggering.

Module-II:

Processors /controllers: Microprocessors, microcontrollers, PID controllers and PLCs.

Module-III:

Drives and mechanisms of an automated system: Drives: stepper motors, servo drives. Ball screws, linear motion bearings, cams, systems controlled by camshafts, electronic cams, indexing mechanisms, tool magazines, and transfer systems.

Module-IV:

Hydraulic system: Hydraulic systems: flow, pressure and direction control valves, actuators, and supporting elements, hydraulic power packs, pumps. Design of hydraulic circuits.

Module-V:

Pneumatic system: Pneumatics: production, distribution and conditioning of compressed air, system components and graphic representations, design of systems.

Text and Reference Books:

1. Bolton W. Mechatronics- Electronic control systems in Mechanical and Electrical Engineering. Pearson Education Ltd.
2. Histand B.H. and Alciatore D.G .Introduction to Mechatronics and Measurement systems Tata McGraw Hill Publishing
3. John W. Webb and Ronald Reis Programmable Logic Controllers Prentice Hall of India.
4. NIIT Programmable Logic Control – Principles and ApplicationsPrentice Hall of India
5. Kholk R.A. and Shetty D.Mechatronics systems design Vikas Publishing, New Delhi
6. Mahalik N.P. Mechatronics principles, concepts and applications Tata McGraw Hill Publishing

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Diploma in Electronics Engineering (Semester-VI)

DEC 6015 VLSI DESIGN (ELECTIVE – I)

OBJECTIVE: Student will be able to:

1. Understand fundamental issues of VLSI technology and to appreciate the limitations imposed by the processing technology on the VLSI circuit designer.
2. Understand system design strategies and their implementation via automated techniques and high level design language.
3. Understand the principles of design verification and testing.
4. Appreciate how the preceding objectives are drawn together in CMOS subsystems design.

Module-I:

VLSI concept and technology: Very Large Scale Integration (VLSI) Technology - Classification of IC Technology, MOSFETs current equation in Linear & Saturation Mode, Threshold voltage-Definition, Derivation of Threshold voltage(Numerical), Body effect & effect of body effect on Threshold voltage, Short channel effect; VLSI Concepts- Resistance & capacitance estimation of MOSFET, C-V (capacitance-voltage) characteristics of MOS capacitor, Principle of MOS scaling, types of scaling, functional limitation of scaling, Wafer Processing with C-Z method, Definition & Application of Mask generation, Oxidation, Diffusion, Ion Implantation, Metallization, Photolithography in MOSFET, Basic process steps of n-MOS, Basic process steps of CMOS, Latch up in CMOS and its prevention.

Module-II:

MOS Inverters: Aspect ratio and Inverter ratio, n-MOS inverter with resistive load, n-MOS inverter with EMD load, n-MOS inverter with DMD load, CMOS inverter, Logic Gates using n-MOS & CMOS.(Only circuit diagram &operation), Realization of any Boolean equation using n-MOS & CMOS.

Module-III:

Finite state machines (FSM): Moore and Mealy machines: Implementation of circuits using Moore and Mealy machines.

Architecture of ASIC and PLD: CPLD -Xilinx and Atmel series architecture, Details of internal block diagram, Introduction to FPGA like Xilinx (FPGA), SPARTAN 3 series and Atmel.

Module-IV:

Hardware Description Language (HDL): Features of Verilog-Entity, Architecture, Configuration, Package, Bus, Driver, Attributes, Process, Behavioral Modeling, Sequential Processing, Data Types.

Simulation, Testing and Synthesis using VHDL: Simulation Issues, Testing Issues, Synthesis Issues Configurations.

Module-V:

Hardware Modeling examples (operation & block Testing): Different styles of modeling, Modeling simple elements, Modeling conditional operators, Modeling combinational logic, Modeling regular structure, Modeling synchronous logic (4)

Text and Reference books:

1. Introduction To VlSI Design by Eugene D. Fabricius, Mcgraw-Hill
2. Principals Of Cmos Vlsi Design by Neil H. E. WesteKamran, Pearson Education
3. Basic VlSI Design by Douglas A. Pucknell, Kamran, Prentice Hall Of India
4. Xilinx Manual, Xilinx, www.Xilinx.Com.

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Diploma in Electronics Engineering (Semester-VI)

DEC6017 MEDICAL ELECTRONICS (ELECTIVE – II)

OBJECTIVE: Student will be able to:

1. Apply the principles of basic sciences and mathematics for engineering solutions
2. Apply the design skills in developing solutions to medical problem, both in terms of hardware and software.
3. Find solutions for medical diagnostic & therapeutic problems.
4. Handle, service and maintain the biomedical equipments.
5. Use modern technology tools necessary for the practice of Medical Electronics.

Module-I:

Introduction to Anatomy and Physiology - Elementary ideas of cell structure; Heart and circulatory system; Central nervous system; Muscle action; Respiratory system; Body temperature and reproduction system.

Overview of Medical Electronics Equipment- classification, application and specifications of diagnostic, therapeutic and clinical laboratory equipment, method of operation of these instruments.

Module-II:

Electrodes- Bioelectric signals, Bio electrodes, Electrode, Electrode tissue interface, contact impedance, Types of Electrodes, Electrodes used for ECG , EEG

Transducers-Typical signals from physiological parameters, pressure transducer, flow transducer, temperature transducer, pulse sensor, respiration sensor.

Module-III:

Bio Medical Recorders- Block diagram, description and application of following instruments:

1. ECG Machine 2. EEG Machine 3. EMG Machine

Module-IV:

Patient Monitoring Systems- Heart rate measurement; Pulse rate measurement; Respiration rate measurement - a. Blood pressure measurement b. Principle of defibrillator and pace maker.

Module-V:

Safety Aspects of Medical Instruments- Gross current shock; Micro current shock; Special design from safety considerations; Safety standards.

Text and Reference books:

1. Handbook of biomedical Instrumentation by RS Khandpur
2. Biomedical Instrumentation by Cromwell,
3. Modern Electronics Equipment by RS Khandpur, TMH, New Delhi
4. Introduction to Biomedical Electronics by Edward J. Perkstein; Howard Bj, USA

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Diploma in Electronics Engineering (Semester-VI)

DEC6013 OPTICAL FIBER COMMUNICATION (ELECTIVE – II)

OBJECTIVE: Student will be able to:

1. Discuss the importance of optical fiber communication.
2. Describe the principle of LED and LD.
3. Describe the operation and circuit of photo detectors.
4. Illustrate the light propagation in optical fibers.
5. Understand the transmission characteristics of optical fibers.

Module-I:

Introduction: Different Optical Communication System, Analog Vs Digital Communication, Need for Optical Communication, Basic Elements of an Optical Communication.

Module-II:

Optical Fibre: Basic Principle involved, Fibre Classification, Acceptance angle, Acceptance Cone, Numerical Aperture, Ray optics representation, Advantages and disadvantages of using optical fiber as communication medium.

Module-III:

Losses and Dispersion in Optical Fibre: Attenuation and its units, simple numerical, Fibre Losses (Material, Scattering, Splice, Absorption, Radiative). Dispersion (Modal, Material, Wave guide).

Module-IV:

Optical Transmitter: Fiber Optic communication system, Transmitter, Different elements of optical transmitter, Light source, its important parameters, Drive Circuit.

Optical Sources : LED, LED structure, light source materials, efficiency and modulation of LED.
Laser Diode, structure, radiation pattern, efficiency & modulation of laser diode.

Module-V:

Optical Receiver: Different elements of optical Receiver, Optical detector and its operating parameters, Demodulation Techniques. Optical Repeaters.
Application: Various applications & future developments of optical communication system.

Text and Reference books:

1. Optical Fiber Communication – By – G. Keiser
2. Optical Fiber and Laser – By – Anuradha De
3. Introduction to Fiber Optics – By – Ghatak and Thyagarajan
4. Optical Fiber Communication – By – J. M. Senior

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Diploma in Electronics Engineering (Semester-VI)

DCS 6017 INTERNET OF THINGS (ELECTIVE – II)

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 and Reference book:

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.