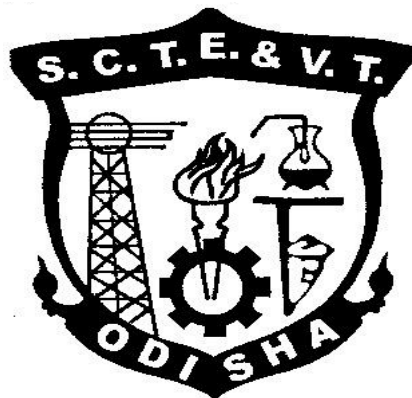


STATE COUNCIL FOR TECHNICAL EDUCATION AND VOCATIONAL TRAINING, ODISHA									
TEACHING AND EVALUATION SCHEME FOR 3rd Semester Electrical (Instrumentation and Control)(wef 2019-20)									
Subject Number	Subject Code	Subject	Periods/week			Evaluation Scheme			
			L	T	P	Internal Assessment/ Sessional	End Sem Exams	Exams (Hours)	Total
Theory									
Th.1		Engg Mathematics-III	4		-	20	80	3	100
Th.2		Circuit and Network Theory	4	-	-	20	80	3	100
Th.3		Digital Electronics	4		-	20	80	3	100
Th.4		Elements Of Instrumentation	4			20	80	3	100
Th.5		Environmental studies	4			20	80	3	100
		<i>Total</i>	20	-		100	400	-	500
Practical									
Pr.1		C Programming Lab	-	-	4	25	25	3	50
Pr.2		Circuit Theory And Simulation Lab	-	-	4	25	50	3	75
Pr.3		Digital Electronics Lab	-	-	4	25	50	3	75
Pr.4		Basic Elements Instrumentation Lab			4	25	25	3	50
		Student Centered Activities(SCA)		-	3	-	-	-	-
		<i>Total</i>	-	-	19	100	150	-	250
		Grand Total	20	-	19	200	550	-	750
Abbreviations: L-Lecturer, T-Tutorial, P-Practical . Each class is of minimum 55 minutes duration									
Minimum Pass Mark in each Theory subject is 35% and in each Practical subject is 50% and in Aggregate is 40%									
SCA shall comprise of Extension Lectures/ Personality Development/ Environmental issues /Quiz /Hobbies/ Field visits/ cultural activities/Library studies/Classes on MOOCS/SWAYAM etc. ,Seminar and SCA shall be conducted in a section.									
There shall be 1 Internal Assessment done for each of the Theory Subject. Sessional Marks shall be total of the performance of individual different jobs/ experiments in a subject throughout the semester									

CURRICULLUM OF 3RD SEMESTER
For
**DIPLOMA IN Electrical (Instrumentation &
Control)ENGINEERING**
(Effective FROM 2019-20 Sessions)



**STATE COUNCIL FOR TECHNICAL
EDUCATION & VOCATIONAL TRAINING,
ODISHA, BHUBANESWAR**

Th1. ENGINEERING MATHEMATICS – III

(COMMON TO ELECT,ETC, AE & I and other Allied branches of Electrical and ETC)

Name of the Course: Diploma in Electrical Engineering			
Course code:		Semester	3 rd
Total Period:	60	Examination :	3 hrs
Theory periods:	4P / week	Internal Assessment:	20
Maximum marks:	100	End Semester Examination ::	80

A. RATIONALE:

The subject engineering mathematics-III is a common paper for engineering branches. This subject includes complex numbers, Matrices, Laplace Transforms, Fourier series, Differential equations and Numerical Methods etc for solution of engineering problems.

B. OBJECTIVE:

On completion of study of Engineering Mathematics-III, the students will be able to:

1. Apply complex number concept in electricity , Quadratic equation , Imaginary numbers in signal processing, Radar & even biology (Brain Waves)
2. Apply Matrices in Engineering fields such as Electrical Circuits and Linear programming.
3. Transform Engineering problems to mathematical models with the help of differential equations and familiarize with the methods of solving by Analytical methods, Transform method and operator method and Numerical methods.
4. Solve algebraic equations by iterative Methods easily programmable in computers.
5. Analysis data and develop interpolating polynomials through method of differences

C. Topic wise distribution of periods:

Sl. No.	Topics	Period
1	Complex Numbers	06
2	Matrices	04
3	Differential Equations	10
4	Laplace transforms	12
5	Fourier Series	12
6	Numerical Methods	04
7	Finite difference & interpolation	12
Total:		60

D. COURSE CONTENTS

1. Complex Numbers

- 1.1 Real and Imaginary numbers.
- 1.2 Complex numbers, conjugate complex numbers, Modulus and Amplitude of a complex number.
- 1.3 Geometrical Representation of Complex Numbers.
- 1.4 Properties of Complex Numbers.

- 1.5 Determination of three cube roots of unity and their properties.
- 1.6 De Moivre's theorem
- 1.7 Solve problems on 1.1 - 1.6

2. Matrices

- 2.1. Define rank of a matrix.
- 2.2. Perform elementary row transformations to determine the rank of a matrix.
- 2.3. State Rouché's theorem for consistency of a system of linear equations in n unknowns.
- 2.4. Solve equations in three unknowns testing consistency.
- 2.5. Solve problems on 2.1 – 2.4

3. Linear Differential Equations

- 3.1. Define Homogeneous and Non – Homogeneous Linear Differential Equations with constant coefficients with examples.
- 3.2. Find general solution of linear Differential Equations in terms of C.F. and P.I.
- 3.3. Derive rules for finding C.F. And P.I. in terms of operator D , excluding $\frac{1}{f(D)} x^n$.
- 3.4. Define partial differential equation (P.D.E) .
- 3.5. Form partial differential equations by eliminating arbitrary constants and arbitrary functions.
- 3.6. Solve partial differential equations of the form $Pp + Qq = R$
- 3.7. Solve problems on 3.1- 3.6

4. Laplace Transforms

- 4.1. Define Gamma function and $\Gamma(n + 1) = n!$ and find $\Gamma\left(\frac{1}{2}\right) = \sqrt{\pi}$.
- 4.2. Define Laplace Transform of a function $f(t)$ and Inverse Laplace Transform .
- 4.3. Derive L.T. of standard functions and explain existence conditions of L.T.
- 4.4. Explain linear, shifting property of L.T.
- 4.5. Formulate L.T. of derivatives, integrals, multiplication by t^n and division by t .
- 4.6. Derive formulae of inverse L.T. and explain method of partial fractions .
- 4.7. solve problem on 4.1- 4.6

5. Fourier Series

- 5.1. Define periodic functions.
- 5.2. State Dirichlet's condition for the Fourier expansion of a function and it's convergence
- 5.3. Express periodic function $f(x)$ satisfying Dirichlet's conditions as a Fourier series.
- 5.4. State Euler's formulae.
- 5.5. Define Even and Odd functions and find Fourier Series in $(0 \leq x \leq 2\pi \text{ and } -\pi \leq x \leq \pi)$.
- 5.6. Obtain F.S of continuous functions and functions having points of discontinuity in $(0 \leq x \leq 2\pi \text{ and } -\pi \leq x \leq \pi)$
- 5.7. Solve problems on 5.1 – 5.6

6. Numerical Methods

- 6.1. Appraise limitation of analytical methods of solution of Algebraic Equations.
- 6.2. Derive Iterative formula for finding the solutions of Algebraic Equations by :
 - 6.2.1. Bisection method
 - 6.2.2. Newton- Raphson method
- 6.3. solve problems on 6.2

7. Finite difference and interpolation

- 7.1. Explain finite difference and form table of forward and backward difference.
- 7.2. Define shift Operator (E) and establish relation between E & difference operator (Δ).
- 7.3. Derive Newton's forward and backward interpolation formula for equal intervals.
- 7.4. State Lagrange's interpolation formula for unequal intervals.
- 7.5. Explain numerical integration and state:
 - 7.5.1. Newton's Cote's formula.
 - 7.5.2. Trapezoidal rule.
 - 7.5.3. Simpson's 1/3rd rule
- 7.6. Solve problems on 7.1- 7.5

Syllabus to be covered up to I.A.

Chapter: 1,2,3 and 4

Learning Resources:			
Sl.No	Title of the Book	Name of Authors	Name of Publisher
1.	Higher engineering mathematics	Dr B.S. Grewal	khanna publishers
2.	Elements of mathematics Vol-1	Odisha state bureau of text book preparation and production	
3.	Text Book of Engineering Mathematics-I	C.R Mallick	Kalayani publication
4.	Text Book of engineering mathematics-III	C.R Mallick	Kalayani publication

Th2. Circuit and Network Theory

(Common to Electrical /EEE/E&M/EIC)

Name of the Course: Diploma in Electrical Engineering			
Course code:			
Total Period:	75(60L+15T)	Semester	3 rd
Theory periods:	4P/week	Examination :	3 hrs
Tutorial:	1P/week	Internal Assessment:	20
Maximum marks:	100	End Semester Examination ::	80

A. Rationale:

Study of Magnetic and Electric Circuits are essential in study of Electrical Engineering. Study of Circuits, Network and Filters constitutes the basic and fundamental aspect of deriving insight into the functioning and analysis of Electrical network, instruments and machineries.

B. Objectives:

After completion of this subject the student will be able to:

1. To develop the concept on Electrical circuit parameters
2. To develop problem solving ability on magnetic Circuit.
3. To develop knowledge on network analysis
4. Use of theorems in problem solving.
5. To develop knowledge on R-L, R-C and R-L-C circuit analysis in A.C
6. To understand the behavior of circuit in transient condition.
7. To develop knowledge of filters and their circuit characteristics

C. TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Name of the Topic	Period
1	Magnetic Circuits	07
2	Coupled Circuits	05
3	Circuit Elements And Analysis	06
4	Network Theorems	08
5	Ac Circuit And Resonance	08
6	Poly-phase Circuit	06
7	Transients	06
8	Two-Port Network	08
9	Filters	06
	TOTAL	60

D. COURSE CONTENT:

1. MAGNETIC CIRCUITS

- 1 . 1 Introduction
- 1 . 2 Magnetizing force, Intensity, MMF, flux and their relations
- 1 . 3 Permeability, reluctance and permeance
- 1 . 4 Analogy between electric and Magnetic Circuits
- 1 . 5 B-H Curve
- 1 . 6 Series & parallel magnetic circuit.
- 1 . 7 Hysteresis loop

2. COUPLED CIRCUITS:

- 2 . 1 Self Inductance and Mutual Inductance
- 2 . 2 Conductively coupled circuit and mutual impedance
- 2 . 3 Dot convention
- 2 . 4 Coefficient of coupling
- 2 . 5 Series and parallel connection of coupled inductors.
- 2 . 6 Solve numerical problems

3. CIRCUIT ELEMENTS AND ANALYSIS:

- 3 . 1 Active, Passive, Unilateral & bilateral, Linear & Non linear elements
- 3 . 2 Mesh Analysis, Mesh Equations by inspection
- 3 . 3 Super mesh Analysis
- 3 . 4 Nodal Analysis, Nodal Equations by inspection
- 3 . 5 Super node Analysis.
- 3 . 6 Source Transformation Technique
- 3 . 7 Solve numerical problems (With Independent Sources Only)

4. NETWORK THEOREMS:

- 4.1 Star to delta and delta to star transformation
- 4.2 Super position Theorem
- 4.3 Thevenin's Theorem
- 4.4 Norton's Theorem
- 4.5 Maximum power Transfer Theorem.
- 4.6 Solve numerical problems (With Independent Sources Only)

5. AC CIRCUIT AND RESONANCE:

- 5.1 A.C. through R-L, R-C & R-L-C Circuit
- 5.2 Solution of problems of A.C. through R-L, R-C & R-L-C series Circuit by

complex algebra method.

5.3 Solution of problems of A.C. through R-L, R-C & R-L-C parallel & Composite Circuits

5.4 Power factor & power triangle.

5.5 Deduce expression for active, reactive, apparent power.

5.6 Derive the resonant frequency of series resonance and parallel resonance circuit

5.7 Define Bandwidth, Selectivity & Q-factor in series circuit.

5.8 Solve numerical problems

6. **POLYPHASE CIRCUIT**

6.1 Concept of poly-phase system and phase sequence

6.2 Relation between phase and line quantities in star & delta connection

6.3 Power equation in 3-phase balanced circuit.

6.4 Solve numerical problems

6.5 Measurement of 3-phase power by two wattmeter method.

6.6 Solve numerical problems.

7. **TRANSIENTS:**

7.1 Steady state & transient state response.

7.2 Response to R-L, R-C & RLC circuit under DC condition.

7.3 Solve numerical problems

8. **TWO-PORT NETWORK:**

8.1 Open circuit impedance (z) parameters

8.2 Short circuit admittance (y) parameters

8.3 Transmission (ABCD) parameters

8.4 Hybrid (h) parameters.

8.5 Inter relationships of different parameters.

8.6 T and π representation.

8.7 Solve numerical problems

9. **FILTERS:**

9.1 Define filter

9.2 Classification of pass Band, stop Band and cut-off frequency.

9.3 Classification of filters.

9.4 Constant – K low pass filter.

9.5 Constant – K high pass filter.

9.6 Constant – K Band pass filter.

9.7 Constant – K Band elimination filter.

9.8 Solve Numerical problems

Syllabus coverage up to Internal assessment

Chapters: 1, 2, 3, 4 and 5.

Learning Resources:			
Sl.No	Title of the Book	Name of Authors	Name of the publisher
1	Electrical Technology Volume – I [for module: 2 only]	B. L. Thereja	S. Chand
2	Introduction to CIRCUIT AND NETWORK	Gargi Basu	Platinum
3	Network Analysis and Synthesis	B.R.Gupta	S.CHAND
4	Circuit and Networks	Sakhija & Nagsarkar	OXFORD
5	CIRCUIT & NETWORKS for modules:- 1,3,4,5,6,7,8,9	A. Sudhakar & Shyam Mohan S Palli	Tata McGraw Hill
6	Introduction to Circuit and Network	Gargi Basu	Platinum Publishers

Th.3 - DIGITAL ELECTRONICS

(Common to ETC, AE&IE, CSE, IT, EIC, Mechatronics)

Theory Marks	: 4 Periods per week	I.A.	:20
Total Periods Marks	: 60 Periods	Term End Exam	: 80
Examination Marks	: 3 Hours	TOTAL MARKS	: 100

Chapter wise Distribution of periods with Total periods

Sl.No.	Topics	Periods
1.	Basics of Digital Electronics	12
2.	Combinational logic circuits	12
3.	Sequential logic circuits	12
4.	Registers, Memories & PLD	08
5.	A/D and D/A Converters	07
6.	Logic Families	09
TOTAL		60

Rationale:

Today term digital has become a part of our everyday life. The tremendous power and usefulness of digital electronics can be seen from the wide variety of industrial and consumer products, such as automated industrial machinery, computers, microprocessors, pocket calculators, digital watches, microcontrollers, Digital life support machines, real time systems and clocks, TV games, etc. Which are based on the principles of digital electronics. The areas of applications of digital electronics have been increasing every day. In fact, digital systems have invaded all walks of life. This subject will very much helpful for student to understand clearly about the developmental concept of digital devices

Objective:

After completion of this course the student will be able to:

1. Explain Binary, Octal, Hexadecimal number systems and compare with decimal system.
2. Perform binary addition, subtraction, Multiplication and Division.
3. Write 1's complement and 2's complement numbers for a given binary number & Perform subtraction
4. Compare weighted and Un-weighted codes and its applications
5. State Boolean expressions for the given statement of the problem

6. State De-Morgan's theorems & Apply De Morgan's theorems and other postulates to simple Boolean expressions.
7. Use Karnaugh map to simplify Boolean Expression (upto 3 variables only).
8. Implement of Logic Gates, i.e. AND, OR, NOT operators with truth table.
9. Working of combinational logic circuits, function of the Half-adder, full-adder.
10. Explain 2's complement parallel adder/ subtractor circuit.
11. Working of Serial & parallel adder with block diagram/circuit diagram
12. Explain the Operation of 4x1 Multiplexer & 1x4 De-multiplexer, Decoders, Encoder, comparator.
13. Understanding the working of Sequential Logic circuits
14. Construct SR, JK, D, T, Master Slave Flip Flop .
15. Counters and different types and operations
16. Explain the working of Registers and memories & PLD
17. Explain various types of memories, Differentiate between ROM and RAM
18. Working of A/D and D/A converters & Necessity of A/D and D/A converters.
19. Explain Various logic families and Characteristics of Digital ICs

Detailed Contents:

Unit-1: Basics of Digital Electronics

- 1.1 Number System-Binary, Octal, Decimal, Hexadecimal - Conversion from one system to another number system.
- 1.2 Arithmetic Operation-Addition, Subtraction, Multiplication, Division, 1's & 2's complement of Binary numbers & Subtraction using complements method
- 1.3 Digital Code & its application & distinguish between weighted & non-weight Code, Binary codes, excess-3 and Gray codes.
- 1.4 Logic gates: AND, OR, NOT, NAND, NOR, Exclusive-OR, Exclusive-NOR--Symbol, Function, expression, truth table & timing diagram
- 1.5 Universal Gates & its Realisation
- 1.6 Boolean algebra, Boolean expressions, Demorgan's Theorems.
- 1.7 Represent Logic Expression: SOP & POS forms
- 1.8 Karnaugh map (3 & 4 Variables) & Minimization of logical expressions, don't care conditions

Unit-2: Combinational logic circuits

- 2.1 Half adder, Full adder, Half Subtractor, Full Subtractor, Serial and Parallel Binary 4 bit adder.
- 2.2 Multiplexer (4:1), De-multiplexer (1:4), Decoder, Encoder, Digital comparator (3 Bit)

2.3 Seven segment Decoder

(Definition, relevance, gate level of circuit Logic circuit, truth table, Applications of above)

Unit-3: Sequential logic Circuits

- 3.1 Principle of flip-flops operation, its Types,
- 3.2 SR Flip Flop using NAND,NOR Latch (un clocked)
- 3.3 Clocked SR,D,JK,T,JK Master Slave flip-flops-Symbol, logic Circuit, truth table and applications
- 3.4 Concept of Racing and how it can be avoided.
- 3.5 Types of Counter & applications
- 3.6 Binary counter, Asynchronous ripple counter (UP & DOWN), Decade counter. Synchronous counter, Ring Counter

Unit-4: Registers, Memories & PLD

- 4.1 Shift Registers-Serial in Serial -out, Serial- in Parallel-out, Parallel in serial out and Parallel in parallel out
- 4.2 Universal shift registers-Applications.
- 4.3 Concept of memories-RAM, ROM, static RAM, dynamic RAM,PS RAM
- 4.4 Basic concept of PLD & applications

Unit-5: A/D and D/A Converters

- 5.1 Necessity of A/D and D/A converters.
- 5.2 D/A conversion using weighted resistors methods.
- 5.3 D/A conversion using R-2R ladder (Weighted resistors) network.
- 5.4 A/D conversion using counter method.
- 5.5 A/D conversion using Successive approximate method

Unit-6: LOGIC FAMILIES

- 6.1 Various logic families & categories according to the IC fabrication process
- 6.2 Characteristics of Digital ICs- Propagation Delay, fan-out, fan-in, Power Dissipation ,Noise Margin ,Power Supply requirement & Speed with Reference to logic families.
- 6.3 Features, circuit operation & various applications of TTL(NAND), CMOS (NAND & NOR)

Coverage of Syllabus upto Internal Exams (I.A.)

Chapter 1,2,3

Books Recommended

- 1. Modern Digital Electronics by RP JAIN TMH
- 2. Fundamental of Digital Electronics by Ananda Kumar-PHI Publication
- 3. Digital Electronics by P.RAJA ,SCITECH Publication
- 4. Digital Circuits Design by S.Salivahanan ,S.Arivazhagan –VIKAS Pub House
- 5. Digital logic and computer design by M. Morris Mano.
- 6. Digital Electronics by Dr. R. S. Sedha , S. chand

Th4. Elements Of instrumentation (Common to AEIE , EIC)

Theory : 4 Periods per week	I.A. :20 Marks
Total Periods : 60 Periods	End SEMExam : 80 Marks
Examination : 3 Hours	TOTAL MARKS : 100 Marks

Chapter wise Distribution of periods with Total periods

Sl.No.	Topics	Periods
1.	Principles of measurement, units & standards	08
2.	Sensing elements	10
3.	Transducers	10
4.	DAQ system	05
5.	Transmission method	05
6.	Electrical& Electronics instrument	10
7.	Optical instruments	05
8.	Basic elements of control system	07
TOTAL		60

Objectives -:

Instrumentation is a collective term for measuring instruments that are used for indicating, measuring and recording physical quantities such as flow, temperature, level, distance, pressure. Instrumentation can refer to device as simple as direct reading thermometer, or as Complex as multi-sensor components of industrial control systems. Today's instruments can be found in Laboratories, refineries, factories and vehicles as well as in every day house hold use (e.g, smoke detectors and thermostats).

Detailed Contents:

Chapter-1 Principles of measurement, units & standards:

- 1.1 Calculation of measurement of process & measuring instrument
- 1.2 Basic block diagram of general instrument system
- 1.3 Selection criteria of measurement instrument
- 1.4 Performance characteristics of an instrument:
 - A: measurement characteristic.
 - B: electrical design characteristic.
 - C: static performance characteristic.
 - D: dynamic performance characteristic.
 - E: endearment characteristic.
 - G: reliable characteristic.
- 1.5 Different types of error of an instrument& theirremides.

- A: personal error, B: random error, C: systematic error, D: instrumentation error, E: environment error, F: observer error, G: limiting & absolute error between.
- 1.6 Distinguish between fundamental & derived unit & also distinguish units & dimensions.
- 1.7 Concept instrumental units.
- 1.8 Derived the relationship between electrostatic unit & electromagnetic unit .
- 1.9 Concept of S.I system of units & its advantage & disadvantage.
A: S.I. based units, B: supplementary units, C: derived units
D: classification of standards: 1. absolute standard, 2. Secondary standard, 3. Inter laboratory standard.
- Chapter-2. SENSING ELEMENT**
- 2.1 Concept of sensor, Distinguish between sensor and Transducer.
- 2.2 Classification of sensor on the basis of quantity its senses field where it used conversions Techniques.
- 2.3 Working principle of pneumatic & Hydraulic, Electronics optical and Biomedical sensor (pulse sensor, respiration sensor,).
- 2.4 Function of elastic, pressure, mass, force, temperature, motion flow label density , vibration , speed & light sensor with neat sketch.
- 2.5 Concept of micro sensor & smart sensor.
- Chapter-3 TRANSDUCER**
- 3.1 Fundamental concept & principle and characteristics of transducers.
- 3.2 Classification of transducer.
- 3.3 Distinguish between Active & passive type of Transducer.
- 3.4 Basic principles of voltage generating Analog, Piezo electric, Thermo electric (RTD Thermistor & thermocouple) opto electronics & hall effect transducer.
- 3.5 Working of the different types of variable parameters, electrical analog type transducers (R,L,C Types & L.V.D.T).
- 3.6 Working of the frequency generating digital transducer & fiber optics transducer.
- 3.7 Introduction of Bio-medical transducers.
- Chapter-4 DATA ACQUISITION SYSTEM**
- 4.1 Analog DAQ system.
- 4.2 Digital DAQ System.
- 4.3 Advance digital DAQ System (Data logger & data logging), General purpose enter face Bus, (GPIP).
- 4.4 Single channel & multi- channel data acquisition system.
- 4.5 Application of DAQ system.
- Chapter-5 TRANSMISSION METHOD**
- 5.1 Various types of transmission method such as (hydraulic, pneumatic, Electrical & electronics types of data transmission).
- 5.2 Explain the basic function of force transmitter (Beam type & STACK).
- 5.3 Force balance transmitter.
- 5.4 Transmission channel & medium.
- 5.5 Distinguish between data transmitter & receiver.
- Chapter-6 ELECTRICAL & ELECTRONICS INSTRUMENT**

- 6.1 Important characteristics of electrical indicating types & displaying types of instrument.
- 6.2 Classification of electrical measuring instrument.
- 6.3 Explain the function & construction of moving iron & moving coil types of indicating electrical Instrument.
- 6.4 PMMC instrument, Dynamometer instrument, induction types instrument & electrostatic instrument (only function & construction).
- 6.5 Explain various types of instrument transformer (current & voltage transformer)
- 6.6 Explain the Galvanometer, ohmmeter, wattmeter.
- 6.7 Analog & digital types of multimeter (Basic principles & function only)
- 6.8 Basic block diagram of CRO & its function Different types of oscilloscope (Analog & Digital type) only introduction.
- 6.9 Attenuator & sweep-generator.
- 6.10 Signal Generator (standard signal generator, Audio Generator function Generator) only function.
- 6.11 Frequency synthize & spectrum analyzer (only principles & concept).

Chapter-7 OPTICAL INSTRUMENT

- 7.1 Working of the basic advantage of optical instruments.
- 7.2 Working of refractive meter, lux meter.
- 7.3 Define fiber optics, sensor, Nano sensor.
- 7.4 Function of telescope & Microscope Photographic camera, refract meter & Lux meter (Basic principles & constructions).

Chapter-8 BASIC ELEMENTS OF CONTROL SYSTEM

- 8.1 Basic elements of a automatic closed loop feedback control system.
- 8.2 Various types such as, hydraulic, pneumatic, Electrical, electronics & Analog, and digital) type controller.
- 8.3 Basic introduction of microcontroller & PLC.
- 8.4 Basic principle of relay & various types of relays.
- 8.5 Control valves only, basic principles & types of control valves (plug valves, butterfly valves, sounder valves, solenoid types of valves.
- 8.6 Introductions of various types of final control elements.

Coverage of Syllabus upto Internal Exams (I.A.)

Chapter 1,2,3,4

Books Recommended:

1. Electrical instrumentation and process control – Publisher- S. Chand Author Dr. J.P Navani.
2. Electronics measurements & instrumentation – Publisher-Dr. S. Chan company Dr. R.S. Sedhu
3. Mechanical measurement and control – Prof. S.K. Khudur- punevidy
4. Industrial measurement & instrumentation – S.K. Singh.
5. Electronics instrumentation & measurement – J. Corr

Th5. ENVIRONMENTAL STUDIES

(Common to all Branches)

Course code:		Semester	3 rd
Total Period:	60	Examination :	3 hrs
Theory periods:	4P / week	Internal Assessment:	20
Maximum marks:	100	End Semester Examination ::	80

A. RATIONALE:

Due to various aspects of human developments including the demand of different kinds of technological innovations, most people have been forgetting that, the Environment in which they are living is to be maintained under various living standards for the preservation of better health. The degradation of environment due to industrial growth is very much alarming due to environmental pollution beyond permissible limits in respect of air, water industrial waste, noise etc. Therefore, the subject of Environmental Studies to be learnt by every student in order to take care of the environmental aspect in each and every activity in the best possible manner.

B. OBJECTIVE:

After completion of study of environmental studies, the student will be able to:

1. Gather adequate knowledge of different pollutants, their sources and shall be aware of solid waste management systems and hazardous waste and their effects.
2. Develop awareness towards preservation of environment.

C. Topic wise distribution of periods:

Sl. No.	Topics	Period
1	The Multidisciplinary nature of environmental studies	04
2	Natural Resources	10
3	Systems	08
4	Biodiversity and it's Conservation	08
5	Environmental Pollution	12
6	Social issues and the Environment	10
7	Human population and the environment	08
	Total:	60

D. COURSE CONTEN

1. The Multidisciplinary nature of environmental studies:

1.1 Definition, scope and importance.

1.2 Need for public awareness.

2. Natural Resources:

Renewable and non renewable resources:

2.1 Natural resources and associated problems.

2.1.1. Forest resources: Use and over-exploitation, deforestation, case studies, Timber extraction mining, dams and their effects on forests and tribal people.

2.1.2. Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dam's benefits and problems.

2.1.3. Mineral Resources: Use and exploitation, environmental effects of extracting and using mineral resources.

2.1.4. Food Resources: World food problems, changes caused by agriculture and over grazing, effects of modern agriculture, fertilizers- pesticides problems, water logging, salinity, .

2.1.5. Energy Resources: Growing energy need, renewable and non-renewable energy sources, use of alternate energy sources, case studies.

2.1.6. Land Resources: Land as a resource, land degradation, man induces landslides, soil erosion, and desertification.

2.2 Role of individual in conservation of natural resources.

2.3 Equitable use of resources for sustainable life styles.

3. Systems:

3.1. Concept of an eco system.

3.2. Structure and function of an eco system.

3.3. Producers, consumers, decomposers.

3.4. Energy flow in the eco systems.

3.5. Ecological succession.

3.6. Food chains, food webs and ecological pyramids.

3.7. Introduction, types, characteristic features, structure and function of the following eco system:

- 3.8. Forest ecosystem:
- 3.9. Aquatic eco systems (ponds, streams, lakes, rivers, oceans, estuaries).

4. **Biodiversity and it's Conservation:**

- 4.1. Introduction-Definition: genetics, species and ecosystem diversity.
- 4.2. Biogeographically classification of India.
- 4.3. Value of biodiversity: consumptive use, productive use, social ethical, aesthetic and optin values.
- 4.4. Biodiversity at global, national and local level.
- 4.5. Threats to biodiversity: Habitats loss, poaching of wild life, man wildlife conflicts.

5. **Environmental Pollution:**

- 5.1. Definition Causes, effects and control measures of:
 - 5.1.1 Air pollution.
 - 5.1.2 Water pollution.
 - 5.1.3 Soil pollution
 - 5.1.4 Marine pollution
 - 5.1.5 Noise pollution.
 - 5.1.6 Thermal pollution
 - 5.1.7 Nuclear hazards.
- 5.2. Solid waste Management: Causes, effects and control measures of urban and industrial wastes.
- 5.3. Role of an individual in prevention of pollution.
- 5.4. Disaster management: Floods, earth quake, cyclone and landslides.

6. **Social issues and the Environment:**

- 6.1. Form unsustainable to sustainable development.
- 6.2. Urban problems related to energy.
- 6.3. Water conservation, rain water harvesting, water shed management.
- 6.4. Resettlement and rehabilitation of people; its problems and concern.
- 6.5. Environmental ethics: issue and possible solutions.
- 6.6. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies.
- 6.7. Air (prevention and control of pollution) Act.
- 6.8. Water (prevention and control of pollution) Act.
- 6.9. Public awareness.

7. **Human population and the environment:**

- 7.1. Population growth and variation among nations.
- 7.2. Population explosion- family welfare program.

- 7.3. Environment and human health.
- 7.4. Human rights.
- 7.5. Value education
- 7.6. Role of information technology in environment and human health.

Syllabus coverage up to Internal assessment

Chapters: 1, 2 and 3.

<u>Learning Resources:</u>			
Sl.No	Title of the Book	Name of Authors	Name of Publisher
1.	Textbook of Environmental studies	Erach Bharucha	#UGC
2.	Fundamental concepts in Environmental Studies	D.D. Mishra	S.Chand & Co-Ltd
3.	Text book of Environmental Studies	K.Raghavan Nambiar	SCITECH Publication Pvt. Ltd.
4.	Environmental Engineering	V.M.Domkundwar	Dhanpat Rai & Co

Pr1. C programming & Web Page Design Lab

(Common to ETC, AE&I,EIC)

Name of the Course: Diploma in Electrical (Instrumentation and Control)Engineering			
Course code:		Semester	3 rd
Total Period:	60	Examination :	3 hours
Lab. periods:	4 P/W	Sessional:	25
Maximum marks:	50	End Semester Examination ::	25

Rationale:

Web design encompasses many different skills and disciplines in the production and maintenance of websites. The different areas of web design include web graphic design; interface design; authoring, including standardised code and proprietary software; user experience design; and search engine optimization. Often many individuals will work in teams covering different aspects of the design process, although some designers will cover them all. The term web design is normally used to describe the design process relating to the front-end (client side) design of a website including writing mark up. Web design partially overlaps web engineering in the broader scope of web development. Web designers are expected to have an awareness of usability and if their role involves creating mark-up then they are also expected to be up to date with web accessibility guideline.

Objective:

After completion of this course the student will be able to:

1. To exploring your business worldwide and makes strong impact image using active online presences with web site. And well-designed and aesthetically appealing website can give you a strong advantage over other online competitors.
2. To make an interesting to see graphic designers on one end, and web programmers on the other, arguing their respective positions active web page designing is today's need.
3. To get strong instantaneous recognition of relevance which leads to clarity and understanding at a glance a well-crafted brand strategy which provides context and perspective, and a detailed website plan that spells out specific objectives, target audiences, paths to conversion other critical elements of your site

List of Practical:

List of Assignments/Tutorial for C program:

Write a C program

Any one from 1 to 3

- 1) To display our College name twenty times on screen.
- 2) To display all even numbers from 1-100.
- 3) To perform addition of 1-100 numbers.

Any one from 4 and 5

- 4) To find smallest / largest number from array elements.
- 5) To sort array elements in ascending / descending order.

Any one from 6 to 8

- 6) To enter elements for 3X3 matrix and display them.
- 7) To calculate addition / subtraction of 2 dimensional matrix.
- 8) To calculate multiplication of 2 dimensional matrix.
- 9) To demonstrate output of standard library functions Strlen (), strcpy (), strcat (), strcmp ().

Any one from 10 and 11

- 10) To calculate area of circle using function.
- 11) To calculate factorial of any given number using recursion.
- 12) To demonstrate call by reference, call by value
- 13) To maintain and manipulate student data using structure.
- 14) To perform 4 arithmetic functions on pointers.

List of Assignments/Tutorial for web page design:

- 1 Browse different search engines and search different topics&Create an e-mail account & use attachment facility
- 2 Design a general webpage Design a general website.
- 3 Design multimedia page which includes Text, Audio, video, images, Animation
- 4 Design a general website & multimedia page which includes
- 5 Upload the website on college server &load website on public internet.
- 6 Designs Web page and apply some block level tags and some text level tags

- &Include Horizontal Rules and special characters in a Web page.
- 7 Design Web page and include different lists & various links in a Web page & Include images with different alignments and wrapped text in Web page. Also include image as a link in the Web page.
 - 8 Design a web page and set background colour and document wide text colour.
 - 9 Design a web page with background image, different text colour for different Paragraphs, and set colors for links, active links and visited links.
 - 10 Create HTML table, format contents in table cells and span the rows and columns.
 - 11 Create basic frameset and format the frames within the frameset using different attributes. Also use frame targeting.
 - 12 Create a basic form using different input controls and pull down menu.

Books Recommended

1. Programming in C by Balgurusamy, Tata MGH
2. Web page Design -TMG/Oxford/BPB publications

Develop programming concepts of students reference Websites:

1. <http://cplus.about.com/od/beginnerctutorial/a/blctut.htm>
2. <http://computer.howstuffworks.com/c.htm>
3. Objective questions: www.google.com
4. <http://www.indiastudycenter.com/studyguides/sc/objtest/default.asp>

Pr2. CIRCUIT THEORY LAB

(Common to ETC, AE&IE, EIC)

Practical Marks	: 4 Periods per week	Sessional	:25
Total Periods Marks	:60 Periods	Term End Exam	:50
Examination Marks	: 3 Hours	TOTAL MARKS	: 75

Rationale:

The Circuit Theory Lab can provide knowledge of measurements of various parameters, verification of different circuits and measuring instruments. Using p-spine software / TINA software student can able to analyse the circuits in the computer and simulate the DC/AC analysis easily for efficient outputs. This lab involved principles of operation of electrical and electronic test equipment and applications to measurement of circuit parameters with transient and steady state response of RLC networks & applications of laws and theories of circuits. Design, prototyping, and testing of electronic devices and circuits

Objective:

After completion of this course the student will be able to:

1. Measurement of Resistance, Voltage, Current, Voltage, Current in A.C & D. C.
2. Measurement of Circuit Parameters by LCR meter
3. Verification of Theorems
4. Determine resonant frequency of series R-L-C circuit.
5. Study of High Pass & low pass filter, Band pass Filter and Band Elimination Filter and determination of its cut-off frequency.
6. Know circuit diagram and explain response of series & parallel resonant circuit
7. Analysis the charging and discharging of an R-C & R-L circuit with oscilloscope.
8. Know rise time, overshoot, damping factor
9. Know Circuit simulation using P-SPICE software. &Construct different circuits using P-SPICE software and compare the measurements and wave forms.

List of Practicals (Any 08 including Project SI no 11)

1. Measurement of Resistance, Voltage, Current in A.C & D. C. Circuit by using digital Multimeter & Clamp meter
2. Verification of
 - (a) Super positions Theorem

- (b) Thevenin's Theorem
 - (c) Norton's Theorem
 - (d) Milliman's Theorem
 - (e) Maximum power theorem
3. Determine resonant frequency of series R-L, R-C, R-L-C circuit and study the quality factor and bandwidth.
 4. Determine the resonant frequency ,Q factor & Band width of parallel resonant circuit
 5. Determine the time constant of R-L-C circuit and analysis the transient response (rise time, overshoot, and damping factor from the oscilloscope)
 6. Study of Low Pass filter and determination of cut-off frequency.
 7. Study of HighPass filter and determination of cut-off frequency.
 8. Study of Band pass Filter and Band Elimination Filter and determination of its cut-off frequency.
 9. Determination of Parameters of Two Port Network (T & Y)
 10. Design attenuator circuit (pie or T)
 11. Mini Project using P-SPICE software: To collect data of catalogues and specification sheet of all the equipment & components used for performing experiment and submit the project on P-SPICE software into Analysis and Plot the graph of each measurement at the end of semester e.g. Butter Worth Filter

Pr3. DIGITAL ELECTRONICS LAB

(Common to ETC, AE&IE, CSE, IT, EIC, Mechatronics)

Practical	: 4 Periods per week	Sessional	:25 Marks
Total Periods	:60 Periods	Term End Exam	:50 Marks
Examination	: 3 Hours	TOTAL MARKS	:75 Marks

Rationale:

The Digital Electronics Laboratory can play a vital role in wide variety applications in the field of microprocessor, microcontrollers & household appliances, among others. It is the inter connection among the digital components and modules. Various digital ICs are discussed. This lab includes combinational logic & sequential logic circuits and its implementations.

Objective:

After completion of this course the student will be able to:

1. Familiarization of Digital Trainer Kit, logic Pulser Logic Probe & Digital ICs
2. Verify truth tables of Digital gates
3. Implement various gates by using universal properties
4. Implement Half adder, Full adder, Half subtractor and Full subtractor using logic gates.
5. Know about Flip Flop, Counters, Registers
6. Study Multiplexer and Demultiplexer.
7. Study 8-bit D/A and A/D conversion.
8. Study display devices, LED, LCD, 7-segment displays.

List of Practical (Any 10 and Mini project Compulsory)

1. Familiarization of Digital Trainer Kit & Digital ICs IE 7400, 7402, 7404, 7408, 7432 & 7486.(draw their pin diagram and features)
2. Verify truth tables of AND, OR, NOT, NOR, NAND, XOR, XNOR gates using ICs& simplifications of Boolean gates
3. Implement various gates by using universal properties of NAND & NOR gates verify and truth table tabulate data.
4. Construct & verify operation of Half adder and Full adder using logic gates.
5. Construct & verify operation of Half Subtractor and Full Subtractor using logic gates.

- 6 Design & Implement a 4-bit Binary to Gray code converter.
- 7 Design & Implement a Single bit/ two bit digital comparator circuit
- 8 Design Multiplexer (4:1) and De-multiplexer (1:4).
- 9 Study the operation of flip-flops (i)S-R flip flop (ii) J-K flip flop (iii) D flip flop (iv) T flip flop
- 10 Realize a 4-bit asynchronous UP/Down Counter.
- 11 Study shift registers -4 bit Registers
- 12 Verify the operation 8-bit D /A and A/ D conversion & test its performance
- 13 Study display devices LCD, 7-segment displays.
- 14 Mini Project using Software: To collect data like pin configurations, display devices, Operational characteristics, applications and critical factors etc. on all digital ICs studied in theory and compile a project report throughout and submit at the end of the semester. To assemble and tests circuits using above digital ICs with test points e.g. Digital Clock / Frequency Counter / Running Glow Light upto 999/Solar cell & Opto coupler applications.

(All the above experiments are to be conducted by through study of ICs)
15. **Digital Works 3.04/** higher version is a graphical design tool that enables you to construct digital logic circuits and to analyse their behaviour through real time simulation. Its intuitive, easy to use interface makes it the ideal choice for learning or teaching digital electronics.

Pr4. Basic Elements instrumentation Lab

Name of the Course: Diploma in Electrical (Instrumentation and Control)Engineering			
Course code:		Semester	3 rd
Total Period:	60	Examination :	3 hours
Lab. periods:	4 P/W	Sessional:	25
Maximum marks:	50	End Semester Examination ::	25

Rationale:

This laboratory is based on different types of sensors & transducers. The methods of operations and its functions with its applications in industries. The instrument lab will play a vital role in today's sensor & Transducers age.

Objective:

After completion of this course the student will be able to:

1. Concept of different types of sensors & transducers.
2. To study about the spectrum Analyzer .
3. To testing of different components with the help of CRO&Multimeter.
4. To measurement of voltage, current, resistance using different methods with the help of CRO &Multimeter.
5. To study about different Valves & Relays.

List of Practicals:

1. (a) To study & measurement of using CRO. Voltage frequency & component testing.
(b) Multimeter- measurement voltage current, resistance, components of testing & calibration.
2. To study of electric sensing device.
3. To study of elastic, thermal, force & vibration sensor.
4. To study of piezo electric, thermoelectric, photoelectric transducer.
5. To study of variable resistance (resistance versus voltage& variable capacitance types measurement
(Capacitance versus voltage).
6. To study about spectrum Analyzer
7. To study of LVDT & measurement Displacement versus voltage.
8. To study about simple microscopes, photographic, camera.
9. To study about optical fiber.
10. To study about slide projector/ overhead projector.
11. To study Relay & various types of Relay.
12. To study various types of valves.