Dharmsinh Desai University

Faculty of Technology

Department of Instrumentation and Control Engineering

Detailed Syllabi Book

Detailed Syllabi for Under Graduate Course of

Instrumentation & Control Engineering

Faculty of Technology

Dharmsinh Desai University, Nadiad

B.TECH.[IC]

Department of Instrumentation & Control Engineering

Faculty of Technology,

Dharmsinh Desai University, Nadiad – 387 001,

Gujarat state, India.

Website: *http://www.ddu.ac.in*

Dharmsinh Desai University

Faculty of Technology

Department of Instrumentation and Control Engineering

TEACHING SCHEME FOR THE COURSE

B.TECH. (INSTRUMENTATION & CONTROL ENGINEERING)

	SEMESTER-I [IC]						
SUBJECT CODE	**SUBJECT**	**TEACHING SCHEME**			**CREDIT STRUCTURE**		**TOTAL CREDIT**
		LECT.	**TUT**	**PRA**	**L+T**	**P**	
AF111	MATHEMATICS-I	4	--	--	4	0	4
AF114	ENGINEERING MECHANICS	3	--	1	4	0.5	3.5
AF115	ENGINEERING GRAPHICS	4	--	3	3	1.5	5.5
AF116	WORKSHOP -I	--	--	3	--	1.5	1.5
AF122	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	4	--	2	4	1	5
AX123	PROGRAMMING IN 'C'	4	--	2	4	1	5
	ENGINEERING ECONOMICS AND PRINCIPLES OF MANAGEMENT	3	--	--	3	--	3
		22	--	11	22	5.5	**27.5**

	SEMESTER-II [IC]						
SUBJECT CODE	**SUBJECT**	**TEACHING SCHEME**			**CREDIT STRUCTURE**		**TOTAL CREDIT**
		LECT.	**TUT**	**PRA**	**L+T**	**P**	
AF201	MATHEMATICS-II	4	--	--	4	0	4
AF204	MECHANICS OF SOLIDS	3	--	2	3	1	4
AF206	WORKSHOP -II	--	--	3	0	1.5	1.5
AF212	ELECTRONICS PRINCIPLES	4	--	2	4	1	5
AF215	HEAT POWER	4	--	2	4	1	5
AX223	ADVANCED 'C' PROGRAMMING	4	--	2	4	1	5
	ENVIORNMENTAL SCIENCE	3	--	--	3	--	3
		22	--	11	22	5.5	**27.5**

SEMESTER-III [IC]							
SUBJECT CODE	**SUBJECT**	**TEACHING SCHEME**			**CREDIT STRUCTURE**		**TOTAL CREDIT**
		LECT.	**TUT.**	**PRA**	**L+T**	**P**	
AF301	MATHEMATICS-III	4	--	--	4	0	4
CI308	LINEAR ELECTRONICS-I	3	1	2	4	1	5
EL304	NETWORK ANALYSIS	3	1	2	4	1	5
EL316	INTRODUCTION TO YOGA	1	--	1	1	0.5	1.5
IC301	ELECTRONIC MEASUREMENT	3	1	2	4	1	5
IC302	DIGITAL ELECTRONICS	3	1	2	4	1	5
							25.5

Dharmsinh Desai University

Faculty of Technology

Department of Instrumentation and Control Engineering

SEMESTER-IV [IC]							
SUBJECT CODE	**SUBJECT**	**TEACHING SCHEME**			**CREDIT STRUCTURE**		**TOTAL CREDIT**
		LECT.	**TUT.**	**PRA**	**L+T**	**P**	
AF401	MATHEMATICS-IV	4	--	--	4	0	4
CI416	ELECTRICAL MACHINES AND POWER	3	1	2	4	1	5
CI418	LINEAR ELECTRONICS-II	3	1	2	4	1	5
EL416	SELF DEVELOPMENT	1	--	1	1	0.5	1.5
IC406	POWER ELECTRONICS	3	1	2	4	1	5
IC407	CONTROL THEORY	3	1	2	4	1	5
							25.5

SEMESTER-V [IC]							
SUBJECT CODE	**SUBJECT**	**TEACHING SCHEME**			**CREDIT STRUCTURE**		**TOTAL CREDIT**
		LECT.	**TUT.**	**PRA**	**L+T**	**P**	
IC511	MICROPROCESSOR AND MICROCONTROLLER	3	1	2	4	1	5
IC502	COMMUNICATION TECHNIQUES	3	1	2	4	1	5
IC513	MEASUREMENT TECHNIQUES	3	1	2	4	1	5
IC506	CONTROL TECHNOLOGY:COMPONENTS AND SYSTEMS	3	1	2	4	1	5
IC507	PROCESS MEASUREMENT	3	1	2	4	1	5
							25

Dharmsinh Desai University

Faculty of Technology

Department of Instrumentation and Control Engineering

SEMESTER-VI [IC]							
SUBJECT CODE	**SUBJECT**	**TEACHING SCHEME**			**CREDIT STRUCTURE**		**TOTAL CREDIT**
		LECT.	**TUT.**	**PRA**	**L+T**	**P**	
IC607	MICROCONTROLLER APPLICATIONS	3	1	2	4	1	5
IC602	INDUSTRIAL MANAGEMENT	3	1	2	4	1	5
IC604	INSTRUMENTATION SYSTEM	3	1	2	4	1	5
IC609	ROBOTICS ENGINERING	3	1	2	4	1	5
IC614	AUTOMATION SYSTEM INTEGRATION	3	1	2	4	1	5
ELECTIVE-1							
IC608	PROCESS INSTRUMENTATION	3	1	2	4	1	5
IC618	APPLIED INSTRUMENTATION	3	1	2	4	1	5
							30

SEMESTER-VII [IC]							
SUBJECT CODE	**SUBJECT**	**TEACHING SCHEME**			**CREDIT STRUCTURE**		**TOTAL CREDIT**
		LECT.	**TUT.**	**PRA**	**L+T**	**P**	
IC701	ADVANCED CONTROL THEORY	3	1	2	4	1	5
IC702	SYSTEM DESIGN	3	1	2	4	1	5
IC703	PROCESS CONTROL	3	1	2	4	1	5
IC707	INDUSTRIAL ELECTRONICS	3	1	2	4	1	5
IC708	BIOMEDICAL INSTRUMENTATION	3	1	2	4	1	5
IC716	INDUSTRIAL EXPOSURE AND PRACTICE	--	--	6	0	3	3
							28

SEMESTER-VIII [IC]							
SUBJECT CODE	**SUBJECT**	**TEACHING SCHEME**			**CREDIT STRUCTURE**		**TOTAL CREDIT**
		LECT.	**TUT.**	**PRA**	**L+T**	**P**	
ELECTIVE-II							
AF801	PROJECT/INDUSTRIAL TRAINING	--	--	28	0	14	14
AF802	SEMINAR	--	--	8	0	4	4
							18

Dharmsinh Desai University

Faculty of Technology

Department of Instrumentation and Control Engineering

B.TECH. SEMESTER – I (IC)

SUBJECT: MATHEMATICS-I (AF111)

SYLLABUS & SCHEME

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hr.)	Sessional (1 hr. 15 min)	Practical	T/W	Total
4	--	--	60	40	--	--	100

[A] DIFFERENTIAL CALCULUS:

Pedal equation, radius of curvature of plane curves in Cartesian, polar and parametric equations, radius of curvature at origin by Newton's method.

[B] SUCCESSIVE DIFFERENTATION :

nth derivatives, Leibnitz's theorem, Maclaurin's theorem, Taylor's theorem, Applications to obtain expansion of functions.

[C] INTEGRAL CALCULUS:

Applications for finding area, length of arc, volume and surface area of solids of revolutions.

[D] REDUCTION FORMULA

$$\int_0^{\frac{\pi}{2}} \sin^n x\,dx,\ \int_0^{\frac{\pi}{2}} \cos^n x\,dx,\ \int_0^{\frac{\pi}{2}} \sin^m x \cos^n x\,dx$$

$$\int_0^{\frac{\pi}{4}} \tan^n x\,dx,\quad \int_0^{\frac{\pi}{4}} \cot^n x\,dx, \ldots\ldots$$

[E] BETA AND GAMMA FUNCTION:

Definition, properties, relation between Beta and Gamma functions, use in evaluation of definite integrals, Error and Elliptic functions.

[F] ORDINARY DIFFERENTIAL EQUATIONS:

Variables, separable, homogeneous, non-homogeneous, linear equations, exact equation and reducible to these forms, Application to geometrical and physical problem.

Text Books :

1. Engineering Mathematics-I
   By: Dr. K.R.Kachot
2. Engineering Mathematics-II
   By : Shanti Narayan , S. Chand & Company (PVT.) Ltd.,Ram nagar, Delhi
3. Higher Engineering Mathematics.
   By : Dr. B.S.Grewal, Khanna publishers, Delhi

Ref. Books :

1. Engineering Mathematics-I
   By : Shanti Narayan
   S. Chand & Company (PVT.) Ltd.
2. Applied Mathematics
   By : P.N. & J.N. Wartikar,Vidhyarthi Grih Publications
3. Engineering Mathematics-I
   By : I.B. Prasad, Khanna Publications,Delhi

INTENDED LEARNING OUTCOMES:

After completion of the course students should be able to:

- Understand the concept of differential calculus
- Understand successive differentiation
- Understand integral calculus and different reduction formulas
- Understand beta and gamma functions
- Understand the concepts of ordinary differential equations

Dharmsinh Desai University
Faculty of Technology
Department of Instrumentation and Control Engineering

B.TECH. SEMESTER – I (IC)

SUBJECT: ENGINEERING MECHANICS(AF114)

SYLLABUS & SCHEME

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr 15 min)	Practical	T/W	Total
3	--	1	60	40	25	25	150

[A] STATICS :

Introduction, engineering and S.I.units, accuracy in engineering calclations, Vectors composition and resolution, concept of Rigid Body.

Resultant of a force system :

i) Concurrent Coplanner Force System

ii) Non concurrent Coplanner Force System

(a) parallel and (b) non parallel

Using analytical as well as graphical methods.

iii) Simple cases of concurrent force system in space.

Concept of internal force, free body diagram. Equilibrium of force system listed above.

Friction : Friction on an inclined plane, ladder friction, wedge friction, screw friction, belt and rope drive. Centre of gravity of lines, plane figures, volumes, bodies and Pappu's Theorem. Principle of Virtual Work and its application.

Types of Beams, Types of Supports, Support Reaction for statically determinate beams.

[B] DYNAMICS :

Rectilinear motion, Circular motion, Projectiles, Relative velocity, Instantaneous centre in plane motion.

Laws of Motion, Motion along an inclined plane, Principle of conservation of Momentum, Mass Moment of Inertia in Rotational Motion, Motion of connected bodies, Impulse and Momentum, Impact, work power and Energy, D Alembert's principle, vibrations of SDOF systems. Motion along a smooth curve and super elevation.

Text Books :

1. Mechanics for Engineers - Statics
   By : F.P.Beer and E.R.Johnston Jr.
2. Mechanics for Engineers - Dynamics
   By :F.P.Beer and E.R.Johnston Jr.
3. Engineering Mechanics: Statics & Dynamics
   By: A.K.Tayal

INTENDED LEARNING OUTCOMES:

After completion of the course students should be able to:

- Understand and describe concept og rigid body
- Describe resultant force systems using analytical and graphical methods
- Describe concept of internal forces
- Describe various types of motions like rectilinear, circular. Projectile etc.
- Understand and describe laws of motion and its applications

Dharmsinh Desai University
Faculty of Technology
Department of Instrumentation and Control Engineering

B.TECH. SEMESTER – I (IC)

SUBJECT: ENGINEERING GRAPHICS(AF115)

SYLLABUS & SCHEME

Teaching Scheme (H/W)				Exam Scheme (Marks)			
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr 15 min)	Prac.	T/W	Total
4	--	3	60	40	25	25	150

Part- I : (Mechanical Part 75 %)

[A] PLANE GEOMETRY :

Construction of curves used in engineering such as conics(ellipse, parabola, hyperbola), Cycloidial curves(cycloid ,epi-cycloid, Hypo-cycloid),involutes, spirals, Loci of points of simple moving mechanisms.

[B] SOLID GEOMETRY :

Projections of Points, Lines (without H.T & V.T) & Planes, right & regular solids (Prisms, Pyramids, cylinder and cone)

[C] ORTHOGRAPHIC PROJECTIONS :

Conversion of pictorial views into orthographic projections with section. Types of section - Full ,section, half section ,Offset section , Local section, Partial Section, Conventions adopted for sectional views, interpretation of orthographic views

[D] ISOMETRIC PROJECTIONS :

Conversion of orthographic views into isometric projections and views.

[E] MACHINE PARTS :

Types of threads, Bolts & Nuts, Locking devices for nuts, Couplings ,Cotter and Knuckle joints, bearings, riveted joints.

[F] COMPUTER GRAPHICS :

Introduction to Computer Graphics.

Part - II Civil Parts: (25 percent weightage)

[A] Brick Masonry

Stretcher Bond, Header Bond, Racking Bond, (Diagonal bond &Herringbone bond), English bond, (1 Brick wall, 1.5 brick wall & 2 brick wall), Flemish Bond(1 brick wall, 1.5 Brick wall & 2 Brick wall)

[B] Door & window:

Door frame & window shutters (Panelled & Glazed door), Casement type wooden window, Ventilator

[C] R.C.C. Lintel with Chajjah:

[D] R.C.C. Stair case:

Different parts, doglegged stair case (Plan & Selection)

[E] Preparation of working drawing for a single storey residential building (Plan , elevation & Selection)

Text books :

1. Engineering Drawing. By : N.D.Bhatt
2. Engineering Drawing Vol : 2 :By : P.J.Shah

Ref. books :

1. Fundamentals of Engineering Drawing. By : Luzadder
2. A Text Book of Geometrical Drawing. By : P.S.Gill
3. A Text Book of Machine Drawing. By : P.S.Gill

INTENDED LEARNING OUTCOMES:

After completing this course students should be able to:

- Get the ideas about various types of curves which are commonly used in engineering practice, problems of plotting path of points on the links of different mechanism, orthographic projection, isometric projection, problems of projection of point, line, plane and solid.

Dharmsinh Desai University
Faculty of Technology
Department of Instrumentation and Control Engineering

B.TECH. SEMESTER – I (IC)

SUBJECT: WORKSHOP – I(AF116)

SYLLABUS & SCHEME

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr 15 min)	Practical	T/W	Total
--	--	3	--	--	--	50	50

[A] INTROUDCTION TO **WORKSHOP:**

workshop layout, importance of various sections/shops of workshop, types of jobs done in each shop, General safety rules and work procedure of work shop

[B] TIN SMITHY (ONE JOB)

Tin smithy tools like hammers, stakes, scissors etc, sheet metal operations such as shearing , bending ,joining, safety precaution , demonstration of various operation

[C] CARPENTRY (ONE PRACTICE JOB AND ONE JOINT JOB)

Carpentry tools like saw, planner, chisels, hammers, pallet, making gauge, vice ,tee square, rule etc, carpentry operations such as marking ,sawing, planning, chiseling, grooving, boring, joining, types of woods and carpentry hardware, safety precaution, demonstration of various operations by using hardware.

[D] PIPE FITTING (ONE JOB)

Pipe fitting tools, pipe fitting operations such as marking, cutting bending threading, assembling, dismantling etc. Types of various spanners such as flat, fix, ring box adjustable etc, safety precautions, demonstration of various operation.

REFERENCES:

Work familiarization : E Wilkinson

Work shop technology : A.K. Hajrachauchari & S. K. Hajrachaudhari

ITB Hand book : Engineering Industry training board

Work shop Technology Vol 1- II : Gupta & Kaushik

INTENDED LEARNING OUTCOMES:

After completing this course students should be able to:

- The students are trained to acquire basic knowledge and skill about engineering materials, manufacturing practices, equipment, tools and safety precautions to observe during manufacturing of different products.
- The students are carryout manual operations using mostly hand tools and elementary machines in carpentry and pattern making shop, bench work and fitting shop, welding shop, sheet metal shop, black smithy and forging shop, machine shop etc.
- The students acquired practical knowledge and skill of using different machines and equipment, various cutting tools, measuring tools and marking tools etc.

Dharmsinh Desai University
Faculty of Technology
Department of Instrumentation and Control Engineering

B.TECH. SEMESTER – I (IC)

SUBJECT: BASIC ELECTRICAL AND ELECTRONICS ENGINEERING (AF122)

SYLLABUS & SCHEME

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr 15 min)	Practical	T/W	Total
4	--	2	60	40	25	25	150

[A] FUNDAMENTALS OF CURRENT ELECTRICITY AND DC CIRCUITS :

Introduction: Definition, Symbol and Unit of Quantities, Multiple and sub-multiple units, Computation of Resistance at constant temperature, Temperature dependence of resistance, Computation of resistance at different temperatures, Computations of at different temperatures, Ohm's law statement, Illustration and limitation, Unit work, power and energy (Electrical, Thermal and Mechanical), Circuits-Identifying the elements and the connected terminology., Kirchhoff's laws-statement and illustration, Resistance in parallel and current division technique, Method of solving a circuit by kirchhoff's laws.

[B] MAGNETIC CIRCUITS :

Introduction, Definition of Magnetic questions, Magnetic circuit, Leakage flux, Fringing effect, Comparison between magnetic and electric circuits.

[C] ELECTROMAGNETIC INDUCTION :

Introduction, Magnetic effect of electric current, Current carrying conductor in magnetic field, Law of electromagnetic induction, Induced emf, Self inductance (L), Mutual inductance(M) ,Coupling coefficient between two magnetically coupled circuits(K).

[D] AC FUNDAMENTALS :

Introduction, Generation of alternating emf, Waveform terminology, Concept of 3-phase EMF Generation, Root mean square (RMS) ot effective value, Average Value of AC, Phasor representation of alternating quantities, Analysis of AC circuit.

[E] SINGLE PHASE AC CIRCUITS :

Introduction, j operator, Complex algebra, Representation of alternating quantities in rectangular and polar forms, R-L series circuit, R-C series circuit, R-L-C series circuit, Admittance and its components, Simple method of solving parallel A.C. circuits, Resonance.

[F] ELECTRICAL MACHINES :

Introduction, D.C. generator, D.C. motor, Transformer, Three phase induction Motor, Applications of electrical machines.

[G] PASSIVE CIRCUIT COMPONENTS :

Constructional details of, Resistors, Capacitors, Inductors.

TEXT BOOK :

1. Basic Electrical, Electronics and Computer Engineering.
   By: R.Muthusubramanian,,S.Dslivshsnsn,,K.A.Muraleedharan Tata McGrawHill Publishing Co Ltd (1994), New Delhi.

REF.BOOK:

1 Electrical Engineering.
By: B. L. Thareja

2. Electrical Machines
By: B. L. Thareja

INTENDED LEARNING OUTCOMES:

After completing this course students should be able to:

- Understand the fundamentals of current electricity and DC circuits
- Understand the concept of magnetic circuits and electromagnetic induction
- Understand AC fundamentals and single phase AC circuits
- Understand the working and applications of electrical machines and passive circuit components

Dharmsinh Desai University
Faculty of Technology
Department of Instrumentation and Control Engineering

B.TECH. SEMESTER – I (IC)

SUBJECT: PROGRAMMING IN 'C'[AX123]

SYLLABUS & SCHEME

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr 15 min)	Practical	T/W	Total
4	--	2	60	40	25	25	150

[A] INTRODUCTION :

Introduction to Computer Hardware & OS, Introduction to DOS commands & languages, Introduction to Programming in C

[B] CONSTANTS, VARIABLES AND DATA TYPES :

Constants , Variables & Data types in C, Declaration & Initialization of C variable, Basic C programs , Defining symbolic constants

[C] OPERATORS AND EXPRESSIONS :

Operators in C, Operators in C & The ? : operator, Arithmetic Expressions & Precedence Rule, Type conversion in C, Mathematical Functions

[D] MANAGING INPUT AND OUTPUT OPERATORS :

Reading / Writing characters, Formatted Input operations, Formatted Output operations

[E] DECISION MAKING AND BRANCHING :

Decision making with If & If .. Else statements, If .. Else statements (Nested …. Ladder), The Switch & goto statements

[F] DECISION MAKING AND LOOPING:

The while statement, The break statement & The Do.. While loop, The FOR loop, Jump within loops - Programs

[G] ARRAYS :

Development of simple programs using loops, Introduction to one dimensional array, Array Programs

TERM WORK: The laboratory and termwork will be based on above topics.

Text Books:

1 PROGRAMMING IN ANSI C
By E. BALAGURUSAMY 2nd Edition TMH Publications

Reference Books:

1 Let us C. By : Yashwant Kanitkar
2. Programming in C By: Venugopal

INTENDED LEARNING OUTCOMES:

After completing this course students should be able to:

- Describe the various features of C language
- Describe the applications of C as a programming language
- Write basic programs using C language.

Dharmsinh Desai University
Faculty of Technology
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B.TECH. SEMESTER – I (IC)
SUBJECT: ENGINEERING ECONOMICS AND PRINCIPLES OF MANAGEMENT
Wef AY 2016-17

SYLLABUS & SCHEME

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr 15 min)	Practical	T/W	Total
3	--	--	60	40	--	--	100

Part-1 (ENGINEERING ECONOMICS)

Sr. No	Topics
1.	**Basic Concepts and Definitions**: Marshall, Robbins and Samuelsons' Definition of Economics. Positive and Normative Economics. Micro and Macro Economics. Utility, goods and services. Money and wealth. Consumer Surplus and producer's surplus.
2.	**Demand Analysis and consumer behaviour**: Demand Function, law of demand, elasticity of demand and its types, price, income and cross elasticity.Measures of demand elasticity Factors of production. Advertising elasticity. law of supply, equilibrium between demand & supply Elasticity.
3.	**Markets, product pricing and factor pricing:** Concept of perfect competition, monopoly and monopolistic competition (meaning and characteristics). Control of monopoly. Price discrimination and dumping. Concept of Duopoly and Oligopoly. Kinky demand curve (price leadership model with reference to oligopoly)
4.	**Production, cost and revenue analysis**: production and production function, short run and long run production function. Cost analysis, various concepts of cost. Total fixed cost, total variable cost, total cost, average fixed cost, average variable cost, average cost and marginal cost. Opportunity cost. Basic concepts of revenue. Relationship between average revenue and marginal revenue.Break-even analysis: meaning, explanation
5.	**Money;** meaning, functions, types, Monetary policy- meaning, objectives, tools, fiscal policy-meaning, objectives, tools Banking; meaning, types, functions, Central Bank- RBI; its functions, concepts; CRR, bank rate, repo rate, reverse repo rate, SLR. Functions of central and commercial banks Inflation, Deflation, Stagflation, Monetary and cycles, new economic policy, Liberalization, Globalization, privatization, , fiscal policy of the government,.

Text Books:

1. Modem Economics by H.L. Ahuja.
2. Modem Economic Theory by K.K. Dewett.
3. Monetary Economics by M.L. Seth.

Reference Books:

1. Engineering Economics, R.Paneerselvam, PHIpublication
2. Fundamentals of Management: Essential Concepts and Applications, Pearson Education, Robbins S.P. and Decenzo DavidA.
3. Economics: Principles of Economics, N Gregory Mankiw, CengageLearning
4. Modern Economic Theory, By Dr. K. K. Dewett& M. H. Navalur, S. ChandPublications
5. Introduction to Economics – Caiseneross
6. Managerial Economics – Jean

Part-2 (PRINCIPLES OF MANAGEMENT)

Sr. No	Topics
1	Nature of Management a. Concept of Management b. Management and Administration c. Importance of Management d. Nature of Management e. Management: Science or Art f. Management as Profession g. Professionalization of Management in India h. Universality of Management i. Applying Management Theory in Practice j. Role of Management Principles k. Effective Management
2	Management Functions and skills a. Management Function b. Nature of Management Functions c. Management Role d. Functions at Various level of Management e. Top Management f. Functions of Board of Directors g. Functions of Chief Executive h. Middle Management i. Supervisory Management j. Functional Areas of Management k. Management Skills l. Top Management Skills

	m. Middle Management Skills n. Supervisory Management Skills
3	Fundamental of Planning a. Concept of Planning b. Nature of Planning c. Importance of Planning d. Steps in Planning e. Types of Planning f. Corporate and Functional Planning g. Strategic and Operational Planning h. Long term and Short term Planning i. Proactive and Reactive Planning j. Formal and Informal Planning k. Types of Plans l. Barriers to Effective Planning m. Making Planning Effective n. Planning in Indian Organizations
4	Fundamental of Organizing a. Concept of Organization and Organizing b. Organization Theory c. Classical Organization Theory d. Modern Organization Theory: Systems Approach e. Modern Organization Theory: Contingency Approach f. Factors Affecting Organization Structure g. Environment h. Strategy i. Technology j. Size of Organization k. People
5	Fundamental of Directing a. Concept of Direction b. Principles of Direction c. Direction and Supervision d. Effective Supervision e. Order Giving f. Technique of Direction g. Directing and Human Factor h. Managerial Models
6	Motivation Theories a. Concept of Motivation b. Theories of Motivation c. Maslow's Need Hierarchy

	d. Herzberg's Motivation-hygiene Theory e. McClelland's Needs Theory f. McGregor's Theory X and Theory Y g. Contingency Approach of Motivation h. Motivational Pattern in Indian Organizations
7	Controlling a. Concept of Controlling b. Controlling and Other Functions c. Steps in Controlling d. Types of Control e. Control Areas f. Controlling and Management by Exception g. Benefits of Management by Exception h. Design of Effective Control System

Reference Books:

- Principles and Practice of Management By L M Prasad
- Stoner James A F, Freeman R Edward & Gilbert Jr Daniel R " Management" New Delhi Prentice-Hall of India
- Koontz Harold &Weihrich Heinz " Essential of Management" New Delhi Tata McGraw Hill
- Burton Gene &Manab Thakur "Management Today" New Delhi Tata McGraw Hill
- Robbins Stephen P & Coulter Mary "Management"New Delhi Prentice-Hall of India

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Department of Instrumentation and Control Engineering

B.TECH. SEMESTER – II (IC)

SUBJECT: MATHS – II(AF201)

SYLLABUS & SCHEME

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr 15 min)	Practical	T/W	Total
4	--	--	60	40	--	--	100

[A] PARTIAL DIFFERENTIATION & ITS APPLICATIONS :

Partial derivatives, Homogenous functions Euler's theorem, Total derivatives - Differentiation of implicit functions, Change of variables, errors and approximations, Maxima & Minima of functions of two variables, Lagrange's method of undetermined multipliers.

[B] MULTIPLE INTEGRALS & THEIR APPLICATIONS :

Double integrals, definition evaluation, change of order of integration, double integrals in polar co-ordinates, area enclosed by plane curves, Triple integrals, change of variables.

[C] INFINITE SERIES :

Introduction, Definitions, Convergence, divergence and Oscillation of a series, P-test, Comparison test, Ratio test, Root test, Higher rario test, Rabbe's test, Log test, Alternating Series, Leibnitz's rule.

[D] COMPLEX NUMBER :

De- Moivre's theorem, and its applications To expand $\sin n\theta, \cos n\theta$ in powers of $\sin\theta$, $\cos\theta$ respectively, To expand $\sin^n\theta$,$\cos^n\theta$ and $\sin^m\theta . \cos^n\theta$ in a series of Sines or Cosines of multiples of θ, Hyperbolic functions, Formulae of hyperbolic functions, Inverse hyperbolic functions, Logarithm of complex quantities. Separation of real and imaginary parts.

[E] LAPLACE TRANSFORMS :

Laplace transforms, Inverse transforms, Note on partial fractions, Transforms of derivatives, Transforms of integrals. Multiplication and division by t.

Text Books :

1. Higher Engineering Mathematics
   By : Dr. B.S. Grewal
   (Khanna publisers,Delhi.)

Ref. Books :

1. Applied Mathematics for Engineers and Physicists.
   By : Pipes & Harvill
   (Mc-Graw Hill Kogakusha Ltd.)
2. Applied Mathematics
   By : P.N. & J.N. Wartikar,Vidhyarthi Grih Publications

INTENDED LEARNING OUTCOMES:

After completion of the course students should be able to:

- Understand the concept of partial differential equation and their applications
- Understand the multiple integrals & their applications
- Understand the concept of infinite series and complex number
- Understand the concept of laplace transformation and its applications

Dharmsinh Desai University
Faculty of Technology
Department of Instrumentation and Control Engineering

B.TECH.SEMESTER – II (IC)

SUBJECT: MECHANICS OF SOLIDS(AF204)

SYLLABUS & SCHEME

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr 15 min)	Practical	T/W	Total
3	--	2	60	40	25	25	150

[A] SIMPLE STRESSES AND STRAINS :

Introduction, stress, strain, tensile, compressive and shear stresses, Elastic limit, Hooke's law, Poisson's Ratio, Modulus of Elasticity, Modulus of Rigidity, Bulk Modulus, Bars of Varying sections, Extension of tapering rods, Bars of uniform strength, temperature stresses, Hoop stress, stress on oblique sections, State of simple shear, Relation between Elastic constants.

[B] MECHANICAL PROPERTIES OF MATERIALS :

Ductility, Brittleness, Toughness, Malleability, Behavior of ferrous and non ferrous metals in tension and compression, shear and bending tests, Standard test pieces, Influence of various parameters on test results, True and nominal stress, Modes of failure, Characteristic stress-strain curves, Strain hardening, Hardness, Different methods of measurement, Izod, Charpy and tension impact tests, Fatigue, Creep, Correlation between different mechanical properties, Effect of temperature.

Testing machines and special features, Different types of extensometers and compressometers, Measurement of strain by electrical resistance strain gauges.

[C] BENDING MOMENT AND SHEAR FORCE :

Bending moment, shear force in statically determinate beams subjected to uniformly distributed, concentrated and varying loads. Relation between bending moment, shear force and rate of loading.

[D] MOMENT OF INERTIA :

Concept of moment if Inertia, Moment of Inertia of plane areas, polar moment of Inertia, Radius of gyration of an area, Parallel Axis theorem, Moment of Inertia of composite Areas, product of Inertia, Principal axes and principal Moments of Inertia.

[E] STRESSES IN BEAMS :

Theory of simple bending, Bending stresses, moment of resistance, modulas of section, Built up and composite beam section, Beams of uniform strength, Distribution of shear stress in different sections.

[F] TORSION :

Torsion of circular. solid and hollow section shafts, shear stress angle of twist, torsional moment of resistance, power transmitted by a shaft, keys and couplings, combined bending and torsion, close coiled helical springs.

[G] PRINCIPLE STRESSES AND STRAINS :

Compound stresses, principle planes and principle stresses, Mohr's circle of stress, priciple strains, Angle of obliquity of resultant stresses, principle stresses in beams, principle stresses in shafts subjected to bending, torsion and axial force.

Text Books :

1. Strength of Materials By : Timoshanko (Vol.1 & 2)
2. Strength of Material By : Popov
3. MechanicsofstructureBy : Junnarkar S.B.
4. Strength of Materials By :S.Ramamrutham.

INTENDED LEARNING OUTCOMES:

After completion of the course students should be able to:

- Understand the concept of stress and strain
- Describe various mechanical properties of materials
- Describe bending moment and shear force, moment of inertia
- Describe stresses in beams

Dharmsinh Desai University
Faculty of Technology
Department of Instrumentation and Control Engineering

B.TECH. SEMESTER – II (IC)

SUBJECT: WORKSHOP – II(AF206)

SYLLABUS & SCHEME

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory	Sessional	Practical (3 hrs)	T/W	Total
--	--	3	-	-	-	50	50

[A] FITTING (ONE JOB)

Fitting tools like files, vice, chisels, punch, scriber, hammers, surface plate, try square, calipers etc, fitting operations such as filling, grinding, sawing, marking, drilling, tapping, safety precaution, demonstration of various operations, preparation of male – female joints.

[B] COLD FORGING (ONE JOB)

Smithy tools like hammer, anvil, flatteners etc, smithy operations such as upsetting, drawing down ,bending, setting down, fork cutting, punching and fullering etc, safety precautions.

[C] **CARPENTRY/UTILITY (ONE JOINT JOB)**

Carpentry tools like saw, planner, chisels, hammers, pallet, making gauge, vice, tee square, rule etc, Carpentry operations such as marking, sawing, planning, chiseling, grooving, boring, joining, types of woods and carpentry hardware, safety precaution, demonstration of various operation by using hardware. Adhesive bonding of laminated sheets

[D] WELDING (ONE JOB)

Electric arc welding. Welding machines, different types of electrodes, screen ,fixers, hand gloves, demonstration of welding operation.

REFERENCES:

1. Work familiarization : E Wilkinson
2. Work shop technology : A.K. Hajrachauchari & S. K. Hajrachaudhari
3. ITB Hand book : Engineering Industry training board
4. Work shop Technology : Vol 1- II : Gupta & Kaushik

INTENDED LEARNING OUTCOMES:

- The students are trained to acquire basic knowledge and skill about engineering materials, manufacturing practices, equipment, tools and safety precautions to observe during manufacturing of different products.
- The students are carryout manual operations using mostly hand tools and elementary machines in carpentry and pattern making shop, bench work and fitting shop, welding shop, sheet metal shop, black smithy and forging shop, machine shop etc.
- The students acquired practical knowledge and skill of using different machines and equipment, various cutting tools, measuring tools and marking tools etc.

Dharmsinh Desai University
Faculty of Technology
Department of Instrumentation and Control Engineering

B.TECH. SEMESTER – II (IC)

SUBJECT: ELECTRONICS PRINCIPLES(AF212)

SYLLABUS & SCHEME

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr 15 min)	Practical	T/W	Total
4	--	2	60	40	25	25	150

[A] DIODE THEORY :

Semiconductor theory, Conduction in crystals, Doping source, The unbiased diode, Forward bias, Reverse bias, Linear devices, The diode graph, Load lines, Diode approximations, D.C. resistance of a diode.

[B] DIODE CIRCUITS :

The sine wave, The transformer, The half wave rectifier, The full wave rectifier, The bridge rectifier, The capacitor input filter.

[C] SPECIAL PURPOSE DIODES :

The zener diode, The zener regulator, Optoelectronic devices.

[D] BIPOLAR TRANSSISTOR :

Some basic ideas, Forward-reverse bias, The CE connection, Transistor characteristics, DC load lines, the transistor switch.

[E] TRANSISTOR BIASING CIRCUITS :

Base bias, Emitter-feedback bias, Collector-feedback, Voltage divider bias, Emitter bias, Moving ground around, PNP circuits.

[F] CE AMPLIFIERS :

Coupling and bypass capacitors, The superposition theorem for amplifiers, AC resistance of the emitter diode, AC beta, The grounded emitter amplifier, The ac model of a CE stage.

[G] CC AND CB AMPLIFIERS :

The CC amplifier, The ac model of an emitter follower, Types of coupling, Direct coupling.

[H] CLASS A AND B POWER AMPLIFIER :

The ac load line of a CE amplifier, AC load lines of other amplifier, Class A operation.

[I] OP-AMP CIRCUITS :

Non inverting voltage amplifiers, The inverting voltage amplifiers, The summing amplifier, Comparators.

[J] OSCILLATORS AND TIMERS :

Theory of sinusoidal oscillation, The wein-bridge oscillator.

[K] THYRISTORS :

The ideal latch, The four-layer diode, The silicon controlled rectifier.

[L] FREQUENCY DOMAIN :

The Fourier series, The spectrum of a signal.

[M] FREQUENCY MIXING :

Nonlinearity, Medium-signal, operation with one sine wave, Medium signal operation with two sine waves.

[N] AMPLITUDE MODULATION :

Basic idea, Percent modulation, AM spectrum, The envelope detector, The super heterodyne receiver.

[O] DIGITAL ICS :

Number system, Boolean algebra, Logic gates.

TEXT BOOK:

(1) Electronic Principles (Third Edition)
By : Albert Paul Malvino Tata McGraw Hill Publishing Co.Ltd,New Delhi.

(2) Basic Electrical,Electronics & Computer Engg.
By-R.Muthusubramanian, S.Salivahanan, K.A.Muraleedharan. Tata McGraw Hill Co,Ltd,New Delhi.

INTENDED LEARNING OUTCOMES:

After completion of the course students should be able to:

- Understand the theory of Diodes and diode circuits
- Understand the concept of special purpose diodes
- Understand the concept bipolar transistor and transistor biasing circuits
- Describe various transistor amplifier circuits
- Understand theory of op-amp circuits, oscillators and timers
- Understand the concept of thyristors, frequency domain
- Understand the concept frequency mixing, amplitude modulation, digital ics

B.TECH. SEMESTER – II (IC)

SUBJECT: HEAT POWER(AF215)

SYLLABUS & SCHEME

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr 15 min)	Practical	T/W	Total
4	--	2	60	40	25	25	150

[A] PROPERTIES OF STEAM :

Distinction between gas and vapour, sensible heat, latent heat, total heat and superheat of steam, conditions of steam, dryness fraction, Methods of determination of dryness fraction, internal energy of steam, specific volume, critical pressure and temperature.

[B] PROPERTIES OF GASES :

Zeroth, first and second laws of thermodynamics, Laws of perfect gases, Boyle's Law, Charle's law, Regnault's law, Joule's law, Characteristic equation, gas constant, internal energy, specific heat at constant pressure and at constant volume, relation between specific heats, thermodynamic processes of perfect gases.

[C] FUELS & COMBUSTION :

Solid, liquid and gaseous fuels used for boilers and I.C. engines, combustion of fuel, air required, products of combustion of fuel, analysis of the flue gases, calorific value of fuel and its determination.

[D] BOILERS :

Classifications of boilers, cochran and Babcock & Wilcox boilers, Boiler mountings and accessories, Draught- natural and artificial.

[E] I.C.ENGINE :

Prime-movers, classification of prime-movers with examples of each class. Advantages of I.C. Engines over E.C. engines, classification of I.C. engines, Thermodynamic air cycles, Carnot cycle, constant volume Otto cycle, constant pressure Joule cycle, Diesel cycle, Air-standard efficiency, construction and working of two stroke and four stroke cycle

engines, P-V diagrams, determination of I.P.,B.P., Mechanical thermal and relative efficiency , Scavenging of I.C. engines, fuel supply in I.C. engines, ignition systems of I.C. engines, cooling of I.C. engines, lubrication of I.C. engines and Governing of I.C. engine.

[F] SOLAR ENERGY :

Introduction, Solar energy systems.

Text Books :

1. Elements of Heat Engines (SI Units) Vol – I By : R.C.Patel & C.J.Karamchandani Acharya Book Depot, Baroda.
2. Elements of Heat Engines (SI Units) By : N.C.Pandya & C.S.Shah Charotar Publishing House, Anand.

Ref.Books :

1. Heat Engine By : P.L.Ballaney
2. A Course in thermodynamics & heat engines. By : Kothandaraman

INTENDED LEARNING OUTCOMES:

- One part of this subject includes study of the basic laws of the science such as Charles law, Gay-Lussac law, and Boyle's law
- Thermodynamic laws such as Zeroth law explains us the very important term "Temperature", First law of thermodynamic explains what is energy, the conservation of energy, Second law explains transformation of energy from one form to another form.
- This subject also deals with the study of different mediums available used for the power generation such as steam and gases, study of combustion of fuels.
- Another part of this subject deals with study of prime movers, the devices which are used for the power generation. Students also studied about boilers, I.C. engines and compressors.

Dharmsinh Desai University
Faculty of Technology
Department of Instrumentation and Control Engineering

B.TECH. SEMESTER – II (IC)

SUBJECT: ADVANCED C PROGRAMMING(AX223)

SYLLABUS & SCHEME

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr 15 min)	Practical	T/W	Total
4	--	2	60	40	25	25	150

[A] STRUCTURES AND UNIONS :

Introduction, Structure definition, Giving values to members, Structure initialization, Comparison of structure variables, Arrays of structures, Arrays within structures, Structures within structures, Structures and functions, Unions, Size of structures, Bit fields, Case studies on structures and unions

[B] POINTERS :

Introduction, Understanding pointers, Accessing the address of a variable, Declaring and initializing pointers, Accessing a variable through its pointer, Pointer expressions, Pointer increments and scale factor, Pointers and arrays, Pointers and character strings, Pointers and functions, Pointers and structures, Pointers on pointers, Case studies on pointers

[C] FILE MANAGEMENT IN C :

Introduction, Defining and opening a file, Closing a file, Input/Output operations on Files, Error handling during i/o operations, Random access to files, Command line arguments, Case studies on file management

[D] DYNAMIC MEMORY ALLOCATION AND LINKED LISTS :

Introduction, Dynamic memory allocation, Concept of linked lists, Advantages of linked lists, Types of linked lists, Pointers revisited, Basic list operations, Application of linked lists, Case studies on Dynamic memory Allocation and linked lists.

[E] THE PREPROCESOR :

Introduction, Macro Substitutions, File inclusion, Compiler control directives,ANSI additions

TEXT BOOK :

1. Programming in ANSI C
   By : E. Balagurusamy
   TMH publications, second edition

REF.BOOK:

1 Let us C.
By : Yashwant Kanitkar
2. Programming inC
By: Venugopal
3. Pointers in C.
By : Yashwant Kanitkar

INTENDED LEARNING OUTCOMES:

After completing this course students should be able to:

- Describe the various features of C language
- Describe the applications of C as a programming language
- Write basic programs using C language.

Dharmsinh Desai University
Faculty of Technology
Department of Instrumentation and Control Engineering

B.TECH. SEMESTER – II (IC)

SUBJECT: ENVIORNMENTAL SCIENCE

SYLLABUS & SCHEME

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr 15 min)	Practical	T/W	Total
3	--	--	60	40	--	--	100

[A] UNIT-1 THE MULTIDISCIPLINARY NATURE OF ENVIORNMENTAL STUDIES:Definition, scope and importance, Need for public awareness.

[B] UNIT 2: NATURAL RESOURCES:

Renewable and non-renewable resources :

Natural resources and associated problems.

a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
d) Food resources: World food problems , changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies
e) Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies.
f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources .
- Equitable use of resources for sustainable lifestyles .

[C] UNIT 3 : ECOSYSTEMS

- Concept of an ecosystem.
- Structure and function of an ecosystem.
- Producers, consumers and decomposers.
- Energy flow in the ecosystem.
- Ecological succession.
- Food chains, food webs and ecological pyramids.
- Introduction, types, characteristic features, structure and function of the following ecosystem :

a. Forest ecosystem
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

[D] UNIT 4: BIODIVERSITY AND ITS CONSERVATION

- Introduction Definition: genetic, species and ecosystem diversity.
- Biogeographical classification of India
- Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values
- Biodiversity at global, National and local levels.
- India as a mega-diversity nation
- Hot-spots of biodiversity,
- Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts,
- Endangered and endemic species of India
- Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity.

[E] UNIT 5: ENVIRONMENTAL POLLUTION

Definition

- Causes, effects and control measures of:
  a. Air pollution
  b. Water pollution
  c. Soil pollution
  d. Marine pollution
  e. Noise pollution
  f. Thermal pollution
  g. Nuclear hazards

- Solid waste Management: Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution.
- Pollution case studies.
- Disaster management: floods. earthquake, cyclone and landslides.

[F] UNIT 6 : **SOCIAL ISSUES AND THE ENVIRONMENT**

- From Unsustainable to Sustainable development
- Urban problems related to energy
- Water conservation. rain water harvesting, watershed management
- Resettlement and rehabilitation of people ; its problems and concerns. Case studies.
- Environmental ethics: Issues and possible solutions.

- Climate change. global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
- Wasteland reclamation.
- Consumerism and waste products.
- Environment Protection Act.
- Air (Prevention and Control of Pollution) Act.
- Water (Prevention and control of Pollution) Act
- Wildlife Protection Act
- Forest Conservation Act
- Issues involved in enforcement of environmental legislation
- Public awareness.

[G] UNIT-7: HUMAN POLLUTION AND THE ENVIORNMENT

- Population growth, variation among nations.
- Population explosion-Family Welfare Programme
- Environment and Human Health
- Human Rights
- Value Education
- HIV/AIDS
- Women and Child Welfare
- Role of Information Technology in Enviornment and human health
- Case Studies

[H] UNIT-8:FIELD WORK

- Visit to local area to document environmental assets-rivers/forest/grasslands/hill/mountains
- Visit to local polluted sites- Urban/Rural/Industrial/Agricultural
- Study of common plants, insects, birds
- Study of simple ecosystems- pond, river, hillslopes etc.

Dharmsinh Desai University
Faculty of Technology
Department of Instrumentation and Control Engineering

B.TECH. SEMESTER – III (IC)

SUBJECT: MATHS – III(AF301)

SYLLABUS & SCHEME

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr 15 min)	Practical	T/W	Total
4	--	--	60	40	--	--	100

[A] FOURIER SERIES :

Euler's Formulae, condition for a Fourier expansion, functions having points of discontinuity, change of interval, odd & even functions, Expansion of odd & even periodic functions, Half-range series.

[B] NUMERICAL METHOD :

Solution of algebraic and transcendental equations, by Newton - Raphson method, Direct iteration method, false position method, Solution of linear simultaneous equation : (1) Gauss - elimination (2) Gauss - jordan (3) Gauss - siedal method , Numerical methods to solve first order and first degree ordinary differential equations by Picard's method &Taylor's series method, Modified Euler's Method, Milne's Method, Runge's method, Runge kutta method.

[C] DIFFERENTIAL EQUATIONS :

Linear differential equations of higher order with constant coefficients, equations reducible to linear equations with constant coefficients, Simultaneous linear equations with constant coefficients. Application to engineering problems.

[D] PARTIAL DIFFERENTIAL EQUATIONS :

Introduction, formation, linear equation of first order, non- linear equations of first order-Charpit's method, homogenous linear equations with constant coefficient to find the complementary functions & the particular integral, non- homogenous linear equations with constant coefficients. Method of separation of variables - vibrating string problem.

[E] LAPLACE TRANSFORMS :

Application to differential equation.

Text Books :

(1) Higher Engineering Mathematics

By : Dr. B.S.Grewal

Ref. Books :

(1) A Text Book of Applied Mathematics

By : P.N. & J.N. Wartikar, Vidhyarthi Grih Publications

(2) Mathematics for Engineering

By : Chandrika Prasad, Prasad Publications, Allhabad

(3) A Text Book of engineering Mathematics

By : Dr. K.N.Srivastva & G.K.Dhawan, Dhanpat Rao and sons, Delhi

INTENDED LEARNING OUTCOMES:

After completion of the course students should be able to:

- Understand fourier series and its applications
- Understand various numerical methods
- Understand differential equations and partial differential equations
- Understand laplace transformation and its applications

B.TECH. SEMESTER – III (IC)

SUBJECT: LINEAR ELECTRONICS – I(CI308)

SYLLABUS & SCHEME

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr 15 min)	Practical	T/W	Total
3	1	2	60	40	25	25	150

[A] SEMICONDUCTORS :

Charged Particles, Field Intensity, Potential Energy, The eV Unit of Energy, Mobility and Conductivity, Electrons and Holes in an Intrinsic Semiconductor, Donor and Acceptor Impurities, Charge Densities in a Semiconductor, Electrical Properties of Ge and Si, The Hall Effect, Thermistors and Sensistors, Diffusion, The Potential Variation within a Graded Semiconductor.

[B] JUNCTION-DIODE CHARACTERISTICS :

The open-circuited p-n Junction, The p-n Junction as a Rectifier, The Volt-Ampere Characteristic, The Temperature Dependence of the V/I Characteristics, Diode Resistance, Space-Charge, or Transition Capacitance C_T, Minority-Carrier Storage in a Diode, Diffusion Capacitance Breakdown Diodes, The diode as a Circuit Element, The load- Line Concept, The Piecewise Linear Diode Model, Junction-Diode Switching Times.

[C] BIPOLAR TRANSISTOR CHARACTERISTICS :

The Junction Transistor, Transistor Current Components, The Transistor as an Amplifier, Transistor Construction, The Common-Base (CB) Configuration, The Common-Emitter (CE) Configuration, The CE Cutoff Currents, The CE Saturation Region, Typical Transistor-Junction Voltage Values Common- Emitter Current Gain, Inverted Mode of Operation, Transistor Ratings, Additional Transistor Characteristics, Transistor Switching Times.

[D] INTEGRATED-CIRCUITS : FABRICATION AND CHARACTERISTICS :

Integrated-Circuit (Microelectronic) Technology, Basic Monolithic Integrated Circuits, Epitaxial Growth, Masking and Etching, Diffusion of Impurities, Transistors for Monolithic Circuits, Monolithic Diodes, The Metal Semiconductor Contact, Integrated Resistors, Integrated Capacitors, Characteristics of Integrated Components, Monolithic-Circuit Layout, Dielectric Isolation Methods.

[E] FIELD-EFFECT TRANSISTORS :

The Junction Field-Effect Transistor, The JFET Volt-Ampere Characteristics, Fabrication of JFETs, The Enhancement Metal-Oxide-Semiconductor Field-Effect, Transistor (MOSFET), The Depletion MOSFET, Technological Improvements.

[F] ANALOG DIODE CIRCUITS :

Clipping (Limiting) Circuits, Clipping at Two Independent Levels, A Breakdown-Diode Voltage Regulator, Rectifiers, Other Full-Wave Circuits, Capacitor Filters, Additional Diode Circuits.

[G] LOW-FREQUENCY AMPLIFIERS :

The Operating Point of a BJT, Bias Stability, Self-Bias or Emitter Bias, Stabilization against Variations in I_{co}, V_{BE} and B, Output Waveforms for a Sinusoidal Input, Approximate Small-Signal BJT Models, The Transistor Transconductance, Linear Analysis of a Transistor Circuit, The Common-Emitter (CE) Amplifier, The Emitter Follower, The Common-Base (CB) Amplifier, Comparison of BJT Amplifier Configurations, The CE Amplifier with an Emitter Resistor, Cascading Transistor Amplifiers, Accurate Small-Signal BJT Models, High-Input-Resistance BJT Circuits, Biasing the Field-Effect Transistor. The JFET or MOSFET Small-Signal Model, the Low-Frequency Common-Source and Common-Drain Amplifiers, the JFET as a Voltage-Controlled Resistor (VCR).

TEXT BOOK :

(1) Integrated Electronics : By Millman & Halkians McGraw-Hill International Edition

INTENDED LEARNING OUTCOMES:

After completion of the course students should be able to:

- Describe semiconductor properties and their applications
- Understand and describe the characteristics of –
  - i) Junction diodes
  - ii) Bipolar transistors
  - iii) Field effect transistors
- Describe analog diode circuits and low frequency amplifiers

Dharmsinh Desai University
Faculty of Technology
Department of Instrumentation and Control Engineering

B.TECH. SEMESTER – III (IC)

SUBJECT: NETWORK ANALYSIS(EL304)

SYLLABUS & SCHEME

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr 15 min)	Practical	T/W	Total
3	1	2	60	40	25	25	150

[A] DEVELOPMENT OF THE CIRCUIT CONCEPT :

Introduction, Charge and Energy, The Relationship of Field and Circuit Concepts, The Capacitance Parameter, The Inductance Parameter, The Resistance Parameter, Units and scaling, Approximation of a Physical System as a circuit.

[B] CONVENTIONS FOR DESCRIBING NETWORKS :

Reference Directions for Current and Voltage, Active Element Conventions, The Dot Convention for Coupled Circuits, Topological Description of Networks.

[C] NETWORK EQUATIONS :

Kirchoff's Laws, The Number of Network Equations, Source Transformations, Examples of the Formulation of Network Equations Loop Variable Analysis, Node Variable Analysis, Determinants: Minors and the Gauss Method, Duality.

[D] INITIAL CONDITIONS IN NETWORKS :

Introduction, Initial Conditions in Elements, Geometrical Interpretation of Derivatives, A Procedure for Evaluating Initial Conditions, Initial State of a Network, Application of Laplace Transform to solution of 1st and 2nd order differential equations arising in electrical circuits.

[E] SOLUTION OF DIFFERENTIAL EQUATIONS :

Classical method of solution of first order and second order differential equations. Solution of first order and higher order differential equations using Laplace Transformation.

[F] TRANSFORMS OF SPECIAL SIGNAL WAVEFORMS :

The Shifted Unit Step Function, The Ramp and impulse Functions, Waveform Synthesis, The Initial and Final Value of f(t) from F(s),The Convolution Integral, Convolution as Summation.

[G] IMPEDANCE FUNCTIONS AND NETWORK THEOREMS :

The Concept of Complex Frequency, Transform Impedance and Transform Circuits, Series and Parallel Combinations of Elements, Superposition and Reciprocity, Thevenin's Theorem and Norton's Theorem.

[H] NETWORK FUNCTIONS: POLES AND ZEROS :

Terminal Pairs or Ports, Network Functions for One Port and Two port . The Calculation of Network Function (1) Ladder Networks (2) General Networks, Poles and Zeros of Network Functions, Restrictions on Pole and Zero Locations for Driving-Point Functions Restrictions on Pole and Zero locations for Transfer Functions, Time-domain Behavior from the Pole & zero plot

[I] FREQUENCY RESPONSE PLOTS :

Parts of Network Functions, Magnitude and Phase Plots, Complex Loci, Plots from s-Plane Phasors, Bode Diagrams.

TEXT BOOK :

(1) Network Analysis By : M.E. Van Valkenburg.

REF.BOOK :

(1) Network Analysis By : G. K. Mithal.

INTENDED LEARNING OUTCOMES:

After completion of the course students should be able to:

- Understand various development concepts of circuits and conventions for networks
- Describe network equations and initial conditions in network
- Describe transforms of special signal waveform, impedance function and network theorems
- Describe concept of network functions, poles and zeros
- Describe frequency response plot

Dharmsinh Desai University

Faculty of Technology

Department of Instrumentation and Control Engineering

B.TECH. SEMESTER – III (IC)

`INTRODUCTION TO YOGA(EL316)

Teaching Scheme (Hours / Week)		Examination Scheme (Marks)			Total (Marks)
Theory	Practical	Theory	Practical	T/W	
1	1	50	50	--	100

(A) THEORY

1) VYUTPATTI OF YOGA
2) DEFINITIONS OF YOGA
3) ORIGIN OF YOGA
4) HISTORY OF YOGA
   - IN PRE CLASSICAL ERA
   - IN CLASSICAL ERA
5) FIRST DOCUMENTATION ON YOGA
6) PERSONALITIES OF YOGA
7) TYPES OF YOGA
8) ASTANGA YOGA
9) YAMA
10) NIYAMA
11) ASANA
    - DEFINITIONS
    - TYPES OF ASANA
    - ASANA ACCORDING TO THE SYSTEMS, ORGANS AND DISEASES
12) PRANAYAM
    - DEFINITIONS
    - TYPES OF PRANAYAM
    - EFEFCTS OF PRANAYAM ON EACH SYSTEM
13) KUNDALINI & SUBTLE SYSTEM

14) PRATYAHAR
- THE CONCEPT OF INDRIYA PANCH-PANCHAK

15) DHARNA
- FIVE STAGES OF THE MANA

16) DHYANA

17) SELF REALIZATION

18) SAMADHI
- DEFINITIONS
- TYPES
- CONCEPT OF PANCH KOSHA

19) MUDRA, MAHAMUDRA, BANDHAS AND SHAT KARMAS

20) STRESS MANAGEMENT

21) MISCONCEPTIONS REGARDING YOGA

22) YOGIC AHARA – YOGINO PATHYAPATHYA

(B) PRACTICAL (Basic Asans)

TRAINING IN YOGIC ASANS, PRANAYAMS AND MUDRAS

1. Initial in every turn:
   Kapalbhati, Anulom vilom Pranayam, Omkar Pranayam, Bharmi, Pranayam, Body Roration, Shavasan, Suryanamaskar, Shavasan
2. Asans for Meditation:
   Padmasan, Swastikasan, Siddhasan, Bhadrasan, Vajrasan, Makarasan, Savasan
3. Asans to be performed in Standing Position:
   Trikonasan, Pervatasan, Utkatukasan, Hastpadsan
4. Asans to be performed while lying in Supine position:
   Servangasan, Halasan, Savasan, Kosthavishramasan, Matshendrasan, Suptavajrasan
5. Asans to be performed while lying in prone position:
   Uttanpadasan, Uttanadhasan, Serpasan, Bhujasan, Salabhasan, Dhanurasan, Makarasan

6. Asans to be performed in sitting position:

   Pavanmuktasan, Hastspadasan, Vajrasan, Ardhamatshyendrasan, Shishuasan, Saptamudrasan, Gomukhasan
7. Yoga Mudras (Seven Types):
8. Pranayam (Seven Types):

INTENDED LEARNING OUTCOMES:

After completion of the course students should be able to:

- Understand benefits of various yoga aasanas
- Improve upon life by practicing them

Dharmsinh Desai University
Faculty of Technology
Department of Instrumentation and Control Engineering

B.TECH. SEMESTER – III (IC)

SUBJECT: ELECTRONIC MEASUREMENT(IC301)

SYLLABUS & SCHEME

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr 15 min)	Practical	T/W	Total
3	1	2	60	40	25	25	150

[A] MEASUREMENT AND ERROR :

Definitions, Accuracy and Precision, Significant Figures Types of Error, Statistical Analysis, Probability of Errors Limiting Errors.

[B] SYSTEM OF UNITS OF MEASUREMENT :

Fundamental and Derived Units, Systems of Units, Electric and magnetic Units, International System of Units, Other Systems of Units, Conversion of Units.

[C] STANDARDS OF MEASUREMENT :

Classification of Standards, Standards for Mass Length, and Volume, Time and Frequency Standards, Electrical Standards, Standards of temperature and Luminous Intensity, IEEE Standards.

[D] DIRECT-CURRENT INDICATING INSTRUMENTS :

Suspension Galvanometer, Torque and Deflection of the Galvanometer, Permanent-Magnet Moving-Coil Mechanism, DC Ammeters, DC Voltmeters, Voltmeter Sensitivity, voltmeter-Ammeter Method of Measuring Resistance, Series-Type Ohmmeter Shunt-Type ohmmeter, Multimeter or VOM, Calibration of DC Instruments, Alternating-Current indicating instruments Thermo instruments, Electrodynamometers in Power Measurements Watt-hour Meter, Power-Factor Meter, Instrument Transformers.

[E] BRIDGES AND THEIR APPLICATION :

Introduction, Wheatstone Bridge, Kelvin Brodge, Guarded Wheatstone Bridge, AC Bridges and Their Application, Comparison Bridges, Maxwell Bridge, Hay Bridge, Schering Bridge, Unbalance Conditions, Wien Bridge, Wagner Ground Connection, Potentiometer.

[F] ELECTRONIC INSTRUMENTS FOR MEASURING BASIC PARAMETERS :

Amplified DC Meter, AC Voltmeter Using Rectifiers, True RMS- Responding Voltmeter, Electronic Multimeter, Considerations in Choosing an Analog Voltmeter, Differential Voltmeters, Digital Voltmeters, Component Measuring Instruments, Q Meter, Vector Impedance Meter, Vector Voltmeter, RF Power and Voltage Measurement.

[G] OSCILLOSCOPES :

Introduction, Oscilloscope Block Diagram, Cathode Ray Tube CRT Circuits, Vertical Deflection System, Delay Line, Multiple Trace, Horizontal Deflection System, Oscilloscope Probes and Transducers, Oscilloscope Techniques, Special Oscilloscopes.

TEXT BOOK :

(1) Electronic Instrumentation and Measurement Technique:Third Edition
By Cooper & Helfrick Prentice Hall of India

REF.BOOK:

(1) Electrical & Electronics Measurement & Measuring Instruments. By A.K. Sawney

INTENDED LEARNING OUTCOMES:

After completion of the course students should be able to:

- Understand concept, systems of units and standards of measurement
- Describe direct current indicating instruments, bridges and their applications
- Describe electronic instruments for measuring basic parameters

Dharmsinh Desai University
Faculty of Technology
Department of Instrumentation and Control Engineering

B.TECH. SEMESTER – III (IC)

DIGITAL ELECTRONICS(IC302)

SYLLABUS & SCHEME

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr 15 min)	Practical	T/W	Total
3	1	2	60	40	25	25	150

[A] BINARY SYSTEMS:

Introduction to digital computers and Digital systems, Binary numbers, Number Base Conversion, Octal and Hexadecimal Numbers, Compliments, Binary Codes, Binary Storages and Register, Binary Logic, Integrated Circuits.

[B] BOOLEAN ALGEBRA AND LOGIC GATE:

Basic Definitions, Axiomatic Definition of Boolean Algebra, Basic Theorems and Property of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Other Logic Operations and Digital Logic Gates, IC Digital Logic Families.

[C] SIMPLIFICATIONS OF BOOLEAN FUNCTIONS:

The Map Method, Two and Three Variable Maps, Four Variable Map, Five and Six Variable Maps, Product of Sum Simplifications, NAND and NOR Implementations, Don't-Care Conditions, The Tabulation Method, Determinations of Prime–Implicates, Selection of Prime-Implicates, Concluding Remarks.

[D] COMBINATIONATIONAL LOGIC:

Introduction, Design Procedure, Address, Subtractor, Code conversion, Analysis Procedure, Multilevel NAND Circuits, Multilevel NOR Circuits, Exclusive OR and Equivalence Functions.

[E] COMBINATIONAL LOGIC WITH MSI AND LSI:

Introduction, Binary Parallel Adder, Decimal Adder, Magnitude Comparator, Decoders, multiplexers, Read Only Memory (ROM), Programmable Logic Array(PLA), Concluding Remarks.

[F] SEQUENTIAL LOGIC:

Introduction, Flip-Flops, Triggering of Flip-flops, Analysis of Clocked Sequential Circuits, State Reduction and Assignments, Flip-Flop Excitation tables, Design Procedure, Design of Counters, Design of State Equations.

[G] REGISTERS, COUNTERA AND THE MEMORY UNIT

Introduction, Registers, Shift Registers, Ripple Counters, Synchronous Counter, Timing Sequence, The Memory Unit, Examples of Random Access Memories.

[H] DIGITAL INTEGRATED CIRCUITS:

Introduction, Bipolar Transistor characteristics, RTL and DTL Circuits Integrated-Injection Logic, Transistor-Transistor Logic, Emitter-Couple Logic, Metal Oxide Semiconductor, complimentary MOS.

TEXT BOOK :

(1) Digital Logic and Computer Design By M.Morris Mano

REF.BOOK:

(1) Microelectronics By Jacob Millman & Arvin Grabel McGraw-Hill International Edition

INTENDED LEARNING OUTCOMES:

After completion of the course students should be able to:

- Study and understand binary systems
- Understand basics of Boolean algebra and logic gates
- Study and understand combinational logic
- Study and understand sequential logic
- Study and understand basics of sequential logics
- Study and understand basics of registers, counters and memory units
- Study and understand basics digital integrated circuits

Dharmsinh Desai University
Faculty of Technology
Department of Instrumentation and Control Engineering

B.TECH. SEMESTER – IV (IC)

SUBJECT: MATHS – IV(AF401)

SYLLABUS & SCHEME

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional **(1 hr 15 min)**	Practical	T/W	Total
4	--	--	60	40	--	--	100

[A] FUNCTIONS OF COMPLEX VARIABLE :

Analytic functions, Cauchy -Rieman equations, Harmonic functions, orthogonal system, complex potential function, Determination of conjugate function, conformal transformation, some standard transformations, bilinear transformation, line integral, properties of complex integration, cauchy's theorem and cauchy's integral formula.

[B] **MATRICES** :

Fundamental concepts, operations, associated matrices, matrix method of solution of simultaneous equations, Rank of matrix, Linear dependence of vectors, consistency of a system of linear equations, characteristic equation, Eigen vectors & Eigen roots, Cayley - Hamilton theorem.

[C] FINITE DIFFERENCES & DIFFERENCE EQUATIONS :

Finite difference, Interpolation, Newton's forward and backward and central differences and Lagrange's formula, Stirling & bessel's formula, Numerical differentiation & Integration, Trapezoidal rule, Simpson's (both) rules, Difference equations with constant coefficient.

[D] VECTOR CALCULUS :

Vector function of a single scalar variable, Differentiation of vectors, simple applications to plane, motion, scalar and vector point functions, Del applied to scalar point function (gradient) Divergence of a vector point function, curl of a vector, second order expressions, line integrals, surface integrals, Green's theorem and Stoke's theorem.

[E] STATISTICAL METHODS :

Binomial distribution, poisson distribution, normal distribution, calculation of errors, probable errors, standard error, coefficient of correlation, lines of regression.

Text Books :

1. Higher Engg. Mathematics
   By : Dr. B.S.Grewal

Ref. Books :

1. A Text Book of Applied Mathematics
   By : P.N. & J.N. Wartikar, Vidhyarthi Grih Publications
2. Mathematics for Engineering
   By: Chandrika Prasad, Prasad Publications, Allahabad
3. A Text Book of engineering Mathematics
   By : Dr. K.N.Srivastva & G.K.Dhawan, Dhanpat Rao and sons, Delhi

INTENDED LEARNING OUTCOMES:

After completion of the course students should be able to:

- Understand functions of complex variables and matrices
- Understand and solve problems on finite differences and difference equations
- Understand and solve problems on vector calculus
- Understand and solve problems wid stastical methods

Dharmsinh Desai University
Faculty of Technology
Department of Instrumentation and Control Engineering

B.TECH. SEMESTER – IV (IC)

SUBJECT: ELECTRICAL MACHINES & POWER(CI416)

SYLLABUS & SCHEME

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr 15 min)	Practical	T/W	Total
3	1	2	60	40	25	25	150

PART -1: ELECTRICAL MACHINE

[A] D.C.MACHNIES :

(1) Generator :

Construction, Principle of working, Types, losses, Power stages, condition for maximum efficiency & power, No load saturation characteristics, load saturation curve, internal, external characteristics of separately excited generator, critical speed & resistance, All of these characteristics without mathematical treatment.

(2) Motor :

Principle, comparison with generator action, condition for maximum power, back emf, torque equations, speed regulation, comparison of shunt, series motor, power stages, speed control methods for shunt & series motors, 3 point starter.

[B] A.C.MACHINES :

(1) Transformer : (1 ph Transformer)

working principle, construction, elementary theory of ideal transformer, E.M.F. equation, transformer on no load & load, equivalent resistance reactance & impedences, equipment ckt., O.C. & S.C. tests, Efficiency & regulation. losses, condition for max^{m} efficiency, All day efficiency, concepts of auto transformer,.

(2) Single Phase Motors:

Types, Making motor self starting, Types of capacitor start & capacitor start-run motors, A.C. Series, Universal & Reluctance motors.

(3) Three Phase Motors:

Classification, merits & demerits, construction, why does rotor rotate, slip, frequency of rotor current, Relation between torque & rotor p.f., starting torque of squirrel cage & slip ring motors, condition for maximum starting torque, effect of change in supply voltage on starting torque, torque slip characters, effect of voltage on torque & speed, Induction motor as a generator, slip & frequency measurement, power stages, torque, mechanical power & rotor output, analogy with mechanical clutch & d.c. motor, sector Induction motor, Linear Induction motor, brief of starting methods & speed control of Induction motor, Crawling & cogging.

(4) Alternators:

Basic principle, difference with D.C. generator, construction, damper winding, factors affecting alternator size, Alternator on load, synchronous reactance, vector diagram of a loaded Alternator, determination of voltage regulation by EMF method, parallel operation, Effect of change in excitation & steam supply.

[C] AC STATER :

Autotransformer and Stardelta

PART – 2 : ELECTRICAL POWER

[A] GENERATING STATIONS :

Non-conventional energy resources, Power plants- thermal, hydro, nuclear, diesel And gas turbine.

[B] POWER FACTOR IMPROVEMENT :

Significance of low and high power factor, Kvar calculations, power factor improving equipment.

[C] MECHANICAL DESIGN OF OVER HEADING LINES :

Main components, conductor materials, line supports, types of insulators, string Efficiency and its improvement,

[D] TRANSMISSION LINE :

Performance of short transmission line.

[E] UNDER GROUND CABLES :

Construction of cables, insulating materials, classification, laying of under Ground cable, insulation resistance, capacitance and dielectric stress in ingle core cable

[F] INTRODUCTION TO SWITCH GEAR :

[G] CURCUIT BREAKER :

Arc phenomenon, principle and methods of arc quenching, oil ckt breaker, plain break oil ckt breaker.

[H] FUSES :

Fuse element material, important terms, types of fuse. [I] RELAY :Introduction and basic relays.

TEXT BOOK :

(1) Electrical Technology (Vol: II) By : B.L.Theraja

(2) A Text Book of Electrical Appliances By : Bhatia

(3) Electrical Power By : V.K.Mehta

INTENDED LEARNING OUTCOMES:

After completing this course students should be able to:

- Describe principle of working, construction, types and features of various DC Machines like- generators and motors
- Describe principle of working, construction, types and features of various AC Machines like- transformers, single and three phase motors, alternators
- Describe principle of working, construction, types and features of various AC starters
- Describe basic features of electrical power generation like generating stations, power factor improvement, overhead lines, transmission lines, underground cables, switch gears, circuit breakers, fuses etc.

Dharmsinh Desai University
Faculty of Technology
Department of Instrumentation and Control Engineering

B.TECH. SEMESTER – IV (IC)

SUBJECT: LINEAR ELECTRONICS – II(CI418)

SYLLABUS & SCHEME

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr 15 min)	Practical	T/W	Total
3	1	2	60	40	25	25	150

[A] FREQUENCY RESPONSE OF AMPLIFIERS :

Frequency Distortion, Step Response of an Amplifier, Effect of Coupling and Emitter Bypass Capacitors on Low frequency, Response, The RC-Coupled Amplifier, The Hybrid Pi Transistor Model at High Frequencies, Variations of Hybrid Pi parameters, The CE Short-Circuit Current Gain, The Generalized Voltage- Gain Function, Single-Stage CE Transistor Amplifier Response, The Gain-Bandwidth Product, Emitter Follower at High Frequencies, High-Frequency Response of Two Cascaded CE Transistor Stages ,Multistage CE Amplifier at High Frequencies, The Common-Source Amplifier at High Frequencies, The Common-Drain Amplifier at High Frequencies, Bandpass of Cascaded Stages.

[B] FEEDBACK AMPLIFIER FREQUENCY RESPONSE :

Effect of Feedback on Amplifier Bandwidth, Double-pole Transfer Function with Feedback, Three-pole Transfer Function with Feedback, Approximate Analysis of a Multipole Feedback Amplifier, Stability, Bode Plots.

[C] OPERATIONAL-AMPLIFIER CHARACTERISTICS :

The Basic Operational Amplifier, The Differential Amplifier, The Emitter-Coupled Differential Amplifier, Transfer Characteristics of a Differential Amplifier, Operational Amplifier Design Techniques, Offset Error Voltages and Currents, Measurement of Operational Amplifier Parameters, Frequency Response of Operational Amplifiers, Compensation, Dominant-Pole Compensation, Pole-Zero Compensation, Lead Compensation.

[D] OPERATIONAL AMPLIFIER SYSTEMS :

Basic Operational Amplifier Applications, Differential (Instrumentation) Amplifiers, AC-Coupled Amplifier, Analog Integration and Differentiation, Electronic Analog Computation, Active Filters, Active Resonant Bandpass Filters, Precision AC/DC Converters, Sample-and-Hold Systems, Analog Multiplexer and Demultiplexer, Logarithmic and Exponential Amplifier, Digital-to-Analog (D/A) Converters, Analog-to- Digital (A/D) Converters.

[E] WAVESHAPING AND WAVEFORM GENERATORS :

Comparators, Applications of Comparators, Regenerative Comparator (Schmitt Trigger),Square-Wave and Triangular-Wave Generators, Pulse Generators, Voltage Time- Base Generators, Step (Staircase) Generators, Modulation of a Square Wave, Sinusoidal Generators, The Phase-Shift Oscillator, A General Form of Oscillator Configuration, The Wien Bridge Oscillator Crystal Oscillators.

[F] POWER CIRCUITS AND SYSTEMS :

Large-Signal Amplifiers, Harmonic Distortion, Amplifier Classification, Efficiency of a lass A Amplifier, Class B Push-Pull Amplifiers, Class AB Operation, Integrated-Circuit Power Amplifiers, Thermal Considerations, Regulated Power Supplies, Monolithic Regulators, A Switching Regulator, Switching Regulator Topologies, Power Field-Effect Transistor (VMOS),Linear regulated power supply, Three pi regulated power supply.

[G] FEEBACK AMPLIFIER CHARACTERISTIC :

Classification of amplifiers, The feedback concept, The Transfer Gain with Feedback, General characteristics of negative feedback amplifiers, Input Resistance, Output Resistance, Method analysis of a feedback amplifier, Voltage-series feedback, Current-series feedback, Current-Shunt feedback, Voltage-shunt feedback.

TEXT BOOK :

(1) Integrated ElectronicsBy : Millman & Halkians McGraw - Hill InternationalEdition

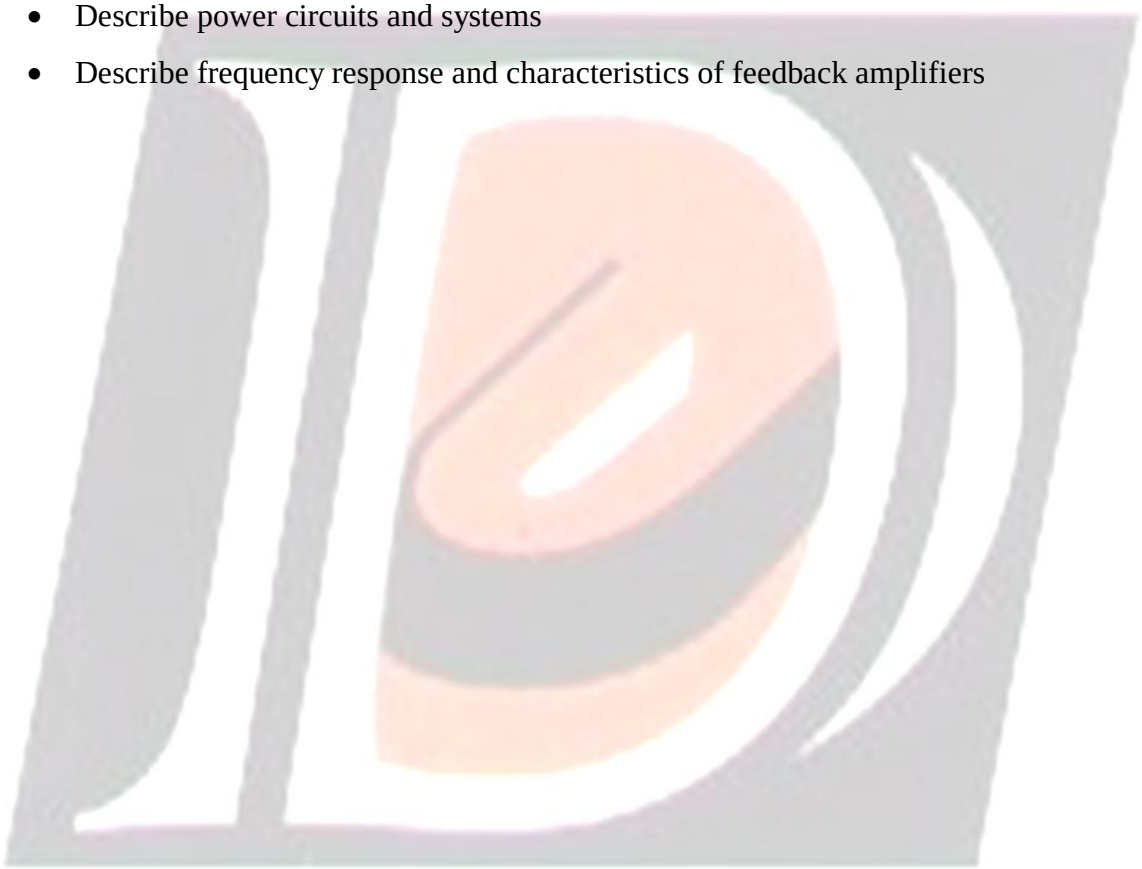
REF. BOOK:

(1) Op- Amp and Linear Integrated Circuits. By : Ramakant A. Gayakwad.

INTENDED LEARNING OUTCOMES:

After completing this course students should be able to:

- Describe frequency response of amplifiers
- Describe the characteristics of operational amplifiers
- Describe systems containing operational amplifiers
- Describe features of waveform shaping and generation
- Describe power circuits and systems
- Describe frequency response and characteristics of feedback amplifiers



B.TECH. SEMESTER – IV (IC)

SELF DEVELOPMENT(EL416)

SYLLABUS & SCHEME

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr 15 min)	Practical	T/W	Total
2	-	-	50	-	-	-	50

MAJOR TOPICS:

1. Paradigm Shift
2. Production / Production-Capability balance
3. Principles of Pro-activity
4. Mission Statement
5. Principles of Personal Management
6. Paradigms of inter-dependence
7. Concept of win-win
8. Concept of empathic listening
9. Synergy
10. Renewal

CREATIVITY:

1. Ways to develop it, Importance of intuition and art of doing nothing for
2. Creativity in Interrelationship
3. Importance of Witness fullness
4. Assumption v/s Self experience
5. Child-Adult-Parent Balance of trails in Individual
6. Responsive Communication: Discussion v/s Argument
7. Concept of Character and its importance in life
8. Success v/s worthwhile ness, Importance of failure
9. Competition and Co-operation

References: 7 Habits of highly effective people by Stephen Covery

B.TECH. SEMESTER – IV (IC)

SUBJECT: POWER ELECTRONICS(IC406)

SYLLABUS & SCHEME

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr 15 min)	Practical	T/W	Total
3	1	2	60	40	25	25	150

(A) POWER SEMICONDUCTOR DEVICES :

Introduction, Types of Power Diode, Series & Parallel operation of Diodes, Power MOSFET, Hybrid devices, Thyristor Applications, Merits & Demerits of Thyristor Converter Systems, Power Semiconductor Converters.

(B) RECTIFYING CIRCUITS & FILTERS :

Review of Halfwave, Fullwave & Bridge rectifiers with filter circuits, Metal Rectifiers.

(C) REGULATORS & POWER SUPPLIES :

Introduction, Thyristor construction, Comparison of Transistor with Thyristor, Thyristor operation characteristics, Types of Thyristors, Series & Parallel operation of Thyristors, Relative performance of power electronic devices.

(D) THYRISTOR TRIGGERING DEVICES :

Introduction, UJT, PUT, DIAC, SCS, SUS, SBS, TRIAC, LASCR, Shockley Diode, Opto-isolators.

(E) THYRISTOR FIRING CIRCUITS :

Introduction, Requirements of Triggering circuits, Thyristors firing circuits, Control of Converters, Firing Angle Control, Integral Cycle method, SCR Phase control by Temperature or Light, On-Off Pulse Control of Thyristor by Saturable Reactor, Blocking Oscillator.

(F) THYRISTOR COMMUTATION CIRCUITS :

Introduction, Turn-off characteristics, Commutation of a thyristor, Condition for Commutation, Jones Turn-off Circuits, Performance of an SCR with different load.

Text Books:

1. Power Electronics: Devices, Circuits, Systems & Applications (2nd Ediition) By: H.C.Rai
2. Thyristors & their Applications by Ramamoorthy
3. Thyristor Engineering by M.S.Berde
4. Power Electronics By: M.D. Singh, K.B. Khandchandani
   Tata Mcgrawhill, 2nd Edition

Reference Books:

1. Power Electronics, by P. C. Sen
2. Thyristor : Theory and Applications, by R. K. Sugandhi & K. K. Sugandhi

INTENDED LEARNING OUTCOMES:

After completing this course students should be able to:

- Understand the basics of Power Semiconductor Devices like SCR, TRIAC, DIODE, and MOSFET
- Understand the basics of triggering devices like UJT, PUT, SUS, SBC, SCS, and DIAC
- Understand the Uncontrolled & Controlled Rectifier
- Understand the Commutation Circuits
- Understand the Linear & Switching Regulators
- Understand the Thyristor Protection Circuit
- Understand the Triggering Circuits
- Make the various application projects using power semiconductor devices

Dharmsinh Desai University
Faculty of Technology
Department of Instrumentation and Control Engineering

B.TECH. SEMESTER – IV (IC)

SUBJECT: CONTROL THEORY(IC407)

SYLLABUS & SCHEME

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr 15 min)	Practical	T/W	Total
3	1	2	60	40	25	25	150

[A] INTRODUCTION :

Open-loop and closed loop control system, Servomechanism, Historical development of control system, sampled data & digital control system, Multivariable control system, Application in non engg. field.

[B] MATHEMATICAL MODEL OF PHYSICAL SYSTEMS :

Introduction, Differential equation of physical systems, Transfer functions, Block diagram algebra, signal flow graph.(Note: Problems on electrical, mechanical & electromechanical systems only.)

[C] FEEDBACK CHARACTERISTICS OF CONTROL SYSTEMS :

Time response, Time domain specifications, steady state and generalized error co-efficient.

[D] FREQUENCY DOMAIN ANALYSIS & STABILITY :

Frequency domain specifications, correlation between time and frequency domain specifications, Bode plot, Polar plot. Concept of stability, R-H criterion, Nyquist stability criterion M & N circles, Nichol's chart.

[E] ROOT LOCUS TECHNIQUE :

Introduction, Rules of construction of root loci, sketching of root locus and applications.

Text Books :

(1) Control System Engineering:By - Nagrath & Gopal

Reference Books :

(1) A course in control engineering":By - A. Subbarao & Parag R. Desai

(2) Modern Control Engineerin By - K. Ogata

(3) Automatic Control System;By - S.N.Verma

(4) Feedback Control Systems By - Di Staffeno

INTENDED LEARNING OUTCOMES:

After completion of the course students should be able to:

- Describe an open and a feedback control system.
- Draw and describe various techniques of control system representation like transfer function, block diagram, SFG, etc.
- Describe the industrial and non industrial applications of feedback control systems.
- Describe time and frequency response of first and second order control systems.
- Analyze stability of control systems using various time domain and frequency domain tools.

Dharmsinh Desai University
Faculty of Technology
Department of Instrumentation and Control Engineering

B.TECH. SEMESTER – V (IC)

SUBJECT: MICROPROCESSOR & MICROCONTROLLER(IC511)

SYLLABUS & SCHEME

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr 15 min)	Practical	T/W	Total
3	1	2	60	40	25	25	150

(A) INTRODUCTION:

Microprocessors, Microprocessor instruction set & computer languages, from large computer to single chip microcontroller, Microprocessor architecture & its operations, memory, input & output (I/O) devices, Example of microcomputer system, Logic devices for interfacing.

(C) 8085 MICROPROCESSOR ARCHITECTURE & INTERFACING:

The 8085 MPU, Example of 8085 based microcomputer, Basic interfacing concepts, memory interfacing, Testing & troubleshooting memory interfacing circuits, interfacing output displays, Interfacing input devices, and memory mapped I/O, Testing & troubleshooting I/O interfacing circuits.

(D) MICROCONTROLLER MCS 8051 ARCHITECTURE:

Introduction, MCS 8051 Architecture, Input & output pins & circuits, External memory interfacing, Counters & timers, serial data input/output, Interrupts.

(D) MCS 8051 ASSEMBLY LANGUAGE PROGRAMMING:

8051 ASSEMBLER:

Introduction, Assembler directives, Numbers, Labels, Symbols. 8051 SIMULATOR: Introduction, features, simulator programs, Application 8051

ASSEMBLY LANGUAGE PROGRAMMING:

The assembly language programming process, The PAL practices CPU, Data Transfer Operations, Logical Operations, Arithmetic Operations, Jump and Call Instructions.

Text Books:

1) Microprocessor Architecture, Programming and Applications with 8085 by R. S. Gaonkar. (4th edition)
2) The 8051 microcontroller architecture, programming & applications(2nd Edition) By Kenneth J. Ayala

Reference Books:

1) Fundamentals of Microprocessors & Microcomputers by B. Ram
2) Introduction to Microprocessors by A. P. Mathur
3) INTEL Manual for MP 8085 and MCS 8051.

INTENDED LEARNING OUTCOMES:

After completing this course students should be able to:

- Understand the basics of Microprocessor & Microcontroller
- Understand the architecture of 8085 & 8051
- Interface Memory & I/O Devices to 8085
- Understand Timing Diagram of 8085 & 8051
- Understand the Instruction Set of 8085 & 8051.
- Programming of 8085 & 8051
- Understand the SFRs of 8051
- Make the various application projects using 8051 & 8085

Dharmsinh Desai University
Faculty of Technology
Department of Instrumentation and Control Engineering

B.TECH. SEMESTER – V (IC)

SUBJECT: COMMUNICATION TECHNIQUE(IC502)

SYLLABUS & SCHEME

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr 15 min)	Practical	T/W	Total
3	1	2	60	40	25	25	150

[A] COMMUNICATION FUNDAMENTALS

Series and parallel resonance, series R-L-C circuit, parallel tuned circuit, skin effect, mutual inductance ,coupling circuits

[B] RECEIVERS

Introduction, super hetrodyne receivers, double conversion receivers, HF communication receivers

[C] MODULATION OF SIGNALS

Amplitude modulation, AM transmitters, Phase Modulation, Angle modulation, frequency modulation, equivalence between FM and phase modulation, Angle modulation circuits and detectors Pulse modulation, pulse transmission, pulse amplitude modulation, time division multiplexing, pulse time modulation

[D] TELEPHONE SYSTEMS

Wire telephony ,public telephone network, commercial telecommunication terminology

[E] DIGITAL COMMUNICATION

Introduction, bit transmission, signaling rate, error probability, digital filtering, PCM, delta Modulation, coding, codes ,error detection and correction codes, digital carrier systems teleprinters and telegraph circuits, radio telegraph transmitters, Introduction to wireless communication (Zigbee)

[F] TV FUNDAMENTALS

Television, TV signals, TV receivers and transmitters

[G] SATELLITE COMMUNICATIONS

Introduction, orbits, station keeping, satellite attitude, path loss, noise consideration, The satellite system

[H] FIBER OPTIC COMMUNICATION

Principles of light transmission in fiber, light sources, photo detector, fiber optic communication system

Text Books:

[1] Electronic communications by Roddy and Coolen

Reference Books:

[1] Electronic communication system by Kennedy

[2] Modern digital ananlog communication system by B.P.Lathi

[3] Telecommunication by Rambhadran

[4] Zigbee and IEEE 802.15.4: A brief introduction and ZIGBee: An overview of upcoming standard by Geir E. Oiem and Patrice Oehen

INTENDED LEARNING OUTCOMES:

After completing this course students should be able to:

- Learn communication fundamentals
- Describe basics of receivers
- Describe various modulation techniques
- Fundamentals of telephone systems, TV communication, satellite communication
- Describe various digital communication Techniques, and fiber optic communication

Dharmsinh Desai University
Faculty of Technology
Department of Instrumentation and Control Engineering

B.TECH. SEMESTER – V (IC)

SUBJECT: MEASUREMENT TECHNIQUE(IC513)

SYLLABUS & SCHEME

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr 15 min)	Practical	T/W	Total
3	1	2	60	40	25	25	150

[A] SPECTROPHOTOMETERS: UV - VIS - IR
Electromagnetic radiation, beer-Lambert law, Absorption Instruments, Colorimeters, Spectrophotometers, Sources of error in Spectrophotometric Measurement, Calibration, Infrared Spectroscopy, Basic Components of Infrared Spectrophotometer, Sample Handling Technique Fourier Transform Infrared Spectroscopy, Calibration, Attenuated Total Reflection Technique, Raman Spectrometers, Photo acoustic and photo thermal Spectrometers.

[B] GAS CHROMATOGRAPHS:
Chromatography, Basic Parts of a Gas Chromatograph, Methods of Measurements of Peak Areas.
Mass Spectrometers: Basic Mass Spectrometers,
Flame Photometers: Principle, Constructional Details of Flame Photometers, Interferences in Flame Photometry,

[C] ELECTRON AND ION SPECTROSCOPY:
Surface Spectroscopic Techniques, Electron Spectroscopy, Instrumentation for Electron Spectroscopy, Ion Spectroscopy, Instrumentation for Ion Spectroscopy, X-Ray Spectrometers, Atomic Absorption Instruments, Sources of Interferences, Meter Scale

[D] FUNDAMENTALS OF INSTRUMENTATION:
Basic concepts of measurement , Fundamental elements of measurement system, Applications of instrumentation systems, Classification of Instruments, Standards & calibration, Errors & Uncertainties in performance parameters, Static performance parameters, Impedance loading & matching, Selection of the instrument, Formulation of system equations, Dynamic response.

[E] INDUSTRIAL MEASUREMENTS:
Sensors for displacement (Potentiometers, Differential transformers, capacitive sensor, Eddy current sensor), Measurement of **Acceleration**
Speed Measurement: Introduction,
Mechanical tachometers: Revolution counter, Centrifugal force tachometer, Resonance tachometer
Electric tachometers: Eddy current type tachometers, Electric Generator type tachometers, Contactless type tachometers, Frequency type tachometers, Ignition type tachometers, Stroboscopic tachometers, Pneumatic type speed transmitting elements, Measurement of Speed, Frequency and Short Time Intervals by direct application of frequency standards by comparative methods.

Analytical parameters measurement
Measurement of the concentration of oxygen, carbon dioxide, organic gases & liquid, Measurement of Humidity, Specific gravity and Viscosity, Measurement of pH & conductivity.

[F] STRAIN MEASUREMENT
Introduction, Factors affecting strain measurements, Types of strain gauges, Theory of operation of resistance strain gauges, Types of electrical strain gauges, Materials for strain gauges, Gauging techniques and other factors, Strain gauge circuits, Temperature compensation,
[G] VIBRATION MEASURMENT: Introduction, Characteristics of vibration, Analysis of vibration sensing devices, Vibration sensing devices, Signal conditioners, Shock measurements, System characteristics, Vibration exciters, Calibration

Text Books:
[1] Instrumentation Devices & Systems by Rangan, Sharma & Mani, 2nd Edition-2005
[2] Mechanical & Industrial Measurement (11th Edition-2004) by R.K. Jain
[3] Handbook of Analytical Instruments by R. S. Khandpur,16th Reprint-2005
[4] Instrumentation Measurement & Analysis by B.C Nakra & K. K. Chaudhry, , 3rd Edition-2013
Reference Books:
[1] Practical Instrumentation Transducers by: OLIVER
[2]Mechanical & Industrial Measurement (11th Edition) by: R.K. JAIN
[3] Handbook of Analytical Instruments by: R. S. KHANDPUR 16th reprint-2005
[4] Instrumentation devices & systems by A.E.Fribance

INTENDED LEARNING OUTCOMES

After completing this course students should be able to:

- Study and learn fundamental and latest concepts of sensor technologies and transducer-transmitter-telemetry fundamentals
- Study and learn industrial and laboratory grade measurement and monitoring techniques
- Study and develop signal conditioning hardware and software
- Study and develop data acquisition from external world
- Study and learn about Analytical and Quality Testing Laboratory Instrumentation

Dharmsinh Desai University
Faculty of Technology
Department of Instrumentation and Control Engineering

B.TECH. SEMESTER – V (IC)

SUBJECT:CONTROL TECHNOLOGY: COMPONENTS & SYSTEMS(IC506)

SYLLABUS & SCHEME

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr 15 min)	Practical	T/W	Total
3	1	2	60	40	25	25	150

[A] MECHANICAL COMPONENTS:

CAMS AND FOLLOWERS:Classification of cams, types of followers, Industrial application of Cams

[B] ELECTRO-MECHANICAL COMPONENTS:

POTENTIOMETER:Classification, types of potentiometer, Selection & Application

TACHOMETERS:Classification and different types tachogenerators, ideal performance of A.C. & D.C. techogenerators, new generation of speed measurement

UNIVERSAL MOTOR: Construction, Operation, Speed control

SERVO MOTOR :DC & AC motors in control systems, construction working, transfer function of DC and AC motor

RELAY & STEPPER MOTORS:Classifications, types, construction & Applications of Relays & Stepper Motors.

SOLENOIDS: Construction, Selection & Different types of Solenoid. SYNCHRO: Construction, application & examples of servo control using synchro

SWITCHES:Single pole, double pole, elect mechanical Brief introduction of Integrators, Gears, Clutches, break

[C]HYBRID COMPONENTS:

OPTO-ELECTRONIC DEVICES:

Classification, Photoconductive, PhotoVoltaic & Photo-emissive sensors with applications.

Liquid Crystal Display device.

CONTROL VALVE & ACTUATORS:

Pneumatic, Hydraulic, Electro-pneumatic & Electrical Actuators, Characteristics of Control Valves, Standard Definitions, Specifications of typical Control Valves of different types.

NUMERICAL CONTROL ELEMENTS: Digital Differential Analyzer (DDA) integrator

OPERATIONAL AMPLIFIER:

Voltage follower, Inverting and non inverting amps, summing, differential amps,

Filters HYDRAULIC DEVICE FOR MOTION CONTROL:

Hydraulic actuators, transfer function for hydraulic system

MODELS OF ELECTRIC

SYSTEMSLC, RC circuit, Lead Lag,

Filter circuits

[D] INTRODUCTION TO CONTROL PROBLEM

Control systems: Terminology and basic structure, The genesis and essence of feedback control theory, Feedback control structure, Multivariable control systems

TEXT BOOKS:

1) Electro-Mechanical Components for Servo Mechanism by Davis & Ledgerwood
2) Electro-Mechanical System Components by Charkey
3) Control System Components by Gibson & Tuteur
4) Numerical Control of Machine Tools by Koren & Benuri
5) Electronic Devices & Circuits – An Introduction by Mottershed
6) Applied Instrumentation in Process Industries Volume – II by Andrews
7) Modern control Technology: Components and systems: 2nd edition by Kilian
8) Control systems principle and design Second edition : M.Gopal.

REF. BOOKS:

1) Mechanical & Industrial Measurements by R. K. Jain
2) Servomechanism Practice by Ahrendt & Savant
3) Theory of Machines Volume – I by Pandya & Shah
4) Electric Motor Repairs by Robert Rosenberg
5) Mechanical Measurements by Sirohi & Radhakrishna
6) Control System Components by Dr. B. Chatterjee
7) Process Control by D. P. Eckman

INTENDED LEARNING OUTCOMES:

After completing this course students should be able to:

- Learn in detail about DC and AC relays and applications for the same, servo motor, stepper motor, cams and follower mechanism, synchro transmitter and receiver technique, different applications of potentiometer and solenoid in industries.
- Describe different types of control valves, applications and control valve sizing.
- Develop any application by using optoelectronic sensors and relays.

B.TECH. SEMESTER – V (IC)

SUBJECT: PROCESS MEASUREMENT(IC507)

SYLLABUS & SCHEME

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr 15 min)	Practical	T/W	Total
3	1	2	60	40	25	25	150

[A] PRESSURE MEASUREMENT:

Manometers, Elastic type – Bourdon tube, diaphragm, bellows elements, Bell gauges, Solid State, Piezo- elastic and vibrating element type pressure transducer, Vacuum gauges Mechanical and electric types, differential pressure transmitter.

[B] FLOW MEASUREMENT:

Theory of flow system, Reynold's number, Variable pressure (Head) type meters-orifice, Orifice calculations and installation, Venturi tube, Pilot tube, Flow nozzle. Variable Area meters-rotameter, Open channel meters, Mass flow meters, Velocity meters, Quantity meters, Electomagnetic flow meter, turbine flow meters, Ultrasonic flow meters, Vortex flow, Anemometers, Flow markers, Laser anemometers, Flow measurement for solid materials.

[C] LEVEL MEASUREMENT:

Theory of level measurement, Float gauges, Differential pressure type level measurement technique, Level measurement by weighing, bubbler technique, thermal effect type, Capacitance type, Ultrasonic and radiation type level measurement techniques, level measurement in open vessels and pressure vessels, Measurement of interface levels, Measurement of level of dry material.

[D] TEMPERATURE MEASUREMENT:

Liquid Gas and Vapour filled thermometers, Bimetal thermometers, Resistance Thermometers RTD, Thermisters, Thermo electric temperature measurement technique Thermocouples and thermopiles Radiation thermometers optical and electrical pyrometers Accuracy and response characteristic of different devices, Differential Temperature measurement.

Text Books:

(1) Industrial Instrumentation – D.P. Eckman.

(2) Principles of industrial instrumentation – Patranabis

(3) Instrumentation Devices and system – Rangan, Sharma

(4) Industrial Instrumentation- Principles & Design – Tattamangalam R.Padmanabham

(5) Instrumentation and Process Measurement- W.Bolten, Universities Press Instrumentation Measurement and Control By A.K. Ghosh, PHI

Ref. Books:

(1) Instrumentation, Measurement and Analysis – Nakra – Chaudhary.

(2) Mechanical And Industrial Measurements – R.K. Jain.

(3) Industrial Instrumentation – A.E. Fribance

(4) Industrial Flow Measurement, 3rd Edition, David W. Spitzer, ISA

(5) Flow measurement methods and applications By- Jim E.Hardy, Jim O. Hylton, Tim E. McKnight, Carl J. Remenyik, Francis R. Ruppel

(6) Temperature Measurement, 2nd Edition By L Michalski, K Eckersdrof, J Kucharski, J McGhee, Wiley

(7) Modern Sensors Handbook, By Pavel Ripka, Wiley

INTENDED LEARNING OUTCOMES:

After completing this course students should be able to:

- Describe standards for process measurements
- Describe various sensors used for measurement of Temperature for industrial applications
- Describe various sensors used for measurement of Pressure for industrial applications
- Describe various sensors used for measurement of Flow for industrial applications
- Describe various sensors used for measurement of Level for industrial applications

Dharmsinh Desai University
Faculty of Technology
Department of Instrumentation and Control Engineering

B.TECH. SEMESTER – VI (IC)

SUBJECT: MICROCONTROLLER APPLICATIONS(IC607)

SYLLABUS & SCHEME

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr 15 min)	Practical	T/W	Total
3	1	2	60	40	25	25	150

(A) AN 8051 MICROCONTROLLER DESIGN :

Introduction, A microcontroller specifications, A microcontroller design, testing the design, Timing subroutines, Lookup tables for the 8051,Serial data transmission, Questions & problems.

(B) APPLICATIONS :

INTERFACING: Introduction, Keyboards, Displays, Pulse measurement, D/A & A/D conversions, Multiple interrupts, Putting it all together. Details and use of some peripheral interfacing chips 8255,8275 (Intel manual), LCD displays (Oriel manual).

SERIAL COMMUNICATION : Introduction, Network configurations,,8051 data communication modes example programs.

(C) INDUSTRIAL APPLICATIONS:

Designing a micro-computer system, Development & trouble shooting tools, Data transfer between two micro-computers in distributed processing, Clock Generation for ADC. Microprocessor Application in protective overcurrent relay, Measurement of electrical quantities like -- frequency, phase angle, power factor, voltage, current etc. Measurement of non-electrical quantities like – temperature, water level, Speed of a motor, pressure. Application Case Studies like --- Microprocessor based stepper motor control, traffic control, firing angle control of SCR, DAS, Temperature Control System, Flow Control System, Multiloop Process Controller, Machine Tool Control, Distributed Computer Control System, Industrial Control Boards.

(D) INTRODUCTION TO 16 BIT MICROPROCESSOR 8086:

Pin Description, operating Mode of 8086, Pin Description for Minimum & maximum mode, Operation of 8086, 8086 registers, interrupts, single stepping mode, multi programming mode, Semaphore, Protection, Multiprocessing, Bus Cycle, Instructions, Addressing modes.

(E) INTRODUCTION TO DSP:

Fundamentals of digital signal processing, Architecture of DSP, Instruction Set, Application of DSP.

Text Books:

1) The 8051 microcontroller architecture, programming & applications(2nd Edition) By Kenneth J. Ayala
2) Fundamentals of Microprocessors & Microcomputers by B.Ram
3) A digital Signal Processing Laboratory using the TMS 320C30 by H.V. Sorenson

Reference Books:

1) Microprocessors with Applications in Process Control by S.J. Ahson
2) Microprocessor Application in Control & Instrumentation by Bibbero
3) Introduction to Microprocessors by A.P. Mathur

INTENDED LEARNING OUTCOMES:

After completing this course students should be able to:

- Interface keyboards with microcontroller system
- Interface LED nad LCD displays with the microcontroller (8051)
- Determine various parameters like frequency, temperature etc with the microcontroller(8051)
- Develop programs and used hardware that expand the interrupt capability of microcontroller(8051) system
- Analyze a system configuration that includes basic hardware
- Describe typical serial configurations
- Using serial modes (8051) to communicate successfully with the hardware
- Describe the architecture and organization of 8086 microprocessor
- Briefly describe 8086 bus cycles and methods of operation
- Briefly describe about basic DSP, its function and features (TMS032C30)
- Select the appropriate microcontroller and other hardware devices according to the application requirement

Dharmsinh Desai University
Faculty of Technology
Department of Instrumentation and Control Engineering

B.TECH. SEMESTER – VI (IC)

SUBJECT: INDUSTRIAL MANAGEMENT(IC602)

SYLLABUS & SCHEME

Teaching Scheme (H / W)			Exam Scheme (Marks)				
Lect.	Tut.	Pra.(GD)	Theory (3 Hrs)	Sessional (1 hr 15 min)	Prac.	T.W	Total
3	1	2	60	40	-----	25	125

[A] **MANAGEMENT :**

Forms of business organization, Organization Structure, Industrial Management, Leadership, Inventory Control, Personnel Management, Marketing Management.

[B] **MANAGEMENT BY OBJECTIVES :**

Introduction – Steps in Setting up M.B.O., Problems in the Approach of M.B.O., Management of Participation, Management by Exception.

[C] **PRODUCTION AND QUALITY CONTROL :**

Production Planning and Control, Job Evaluation and Merit Rating, Production and Productivity, Quality Control.

[D] **WORK-STUDY :**

Work study and Productivity, Motion Study (Method study), Time study (Work Measurement).

[E] **MODERN MANAGEMENT TECHNIQUES :**

Gantt Charts, Critical Path Method (C.P.M.), Program Evaluation and Review Technique (P.E.R.T.).

[F] **INFORMATION SYSTEM AND CONTROL :**

Introduction, Definition, Need for Information System, Aims, Characteristics, Objectives of Good Management, Information System, Sources of Information, Application of Management Information System, Design of Management Information System, Development, Implementation of Management Information System, Levels of Management and Management Information System, Information handling.

[G] **LABOUR AND INDUSTRIAL ACTS :**

Welfare Organization, Industrial Relations and Trade unions, The Indian Factories Act, The Indian Electricity Rules, Industrial Disputes Act, Workmen's Compensation Act, The Trade Union Act.

[H] **ORGANISATION OF INSTRUMENTATION DEPARTMENT :**

Responsibilities of Department to Management, Consulting service to other Departments, Process Control Engineers, Process Control Research, Selecting and Training Personnel for Instrument Work, Labour Relations and Preventive Maintenance.

Text Book :

(1) Industrial Organization and Engineering Economics
By – T.R. Banga & S.C. Sharma (23rd Edition). 2005.
(2) Industrial Instrument Servicing Handbook By - Carrol

Ref. Books :

(1) Business Organization and ManagementBy – M.C.Shukla
(2) Managerial EconomicsBy – G.S. Gupta
(3) Elementary Economic TheoryBy – Dewett & Verma
(4) Management By – Stoner & Wankel (3rd Edition)

INTENDED LEARNING OUTCOMES:

After completion of the course students should be able to:

- Describe the usefulness of a proper industrial management system
- Describe various ways for production and quality control
- Describe different labour and Industrial acts
- Describe various methods to organize an instrumentation department.

Dharmsinh Desai University
Faculty of Technology
Department of Instrumentation and Control Engineering

B.TECH. SEMESTER – VI (IC)

Elective 1: PROCESS INSTRUMENTATION(IC608)

SYLLABUS & SCHEME

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr 15 min)	Practical	T/W	Total
3	1	2	60	40	25	25	150

(A) SIGNAL CONDITIONING :

Instrumentation amplifiers, Phase Sensitive Detector, V/F & F/V Converters, Filtering of Signals, Applications of DSP e.g. digital filters.

(B) TELEMETERING :

Incremental Current design, Alternating current systems, Direct current systems, Digital Telemetering.

(C) P/I AND P/I CONVERTERS:

Manometric transducers, Torque balance design, Oscillaor type, electro pneumatic transducers, Transducer positioners, magnetic converters, differential transformer converters.

(D) CONTROLLERS :

Controller principles, Analog, Digital & Hydraulic Controllers, Controller Tuning, Self-tuning controllers, Methods of specifying the controllers, Specifications of typical controllers.

(E) CONTROL LOOP CHARACTERISTICS:

Introduction, Single and multivariable control systems, Control system quality, Stability, Process loop tuning

(F) CONTROL VALVE SIZING :

Calculation of Control Valve Co-efficient & Case studies
for different services & fluids, Information about the Industry standards & recommended practices for Control Valves.

Text Books :

1. Process Control Instrumentation Technology, by C. D. Johnson (3rd Edition)
2. Instrumentation - Devices & Systems, by Rangan, Sarma & Mani.
3. Fundamentals of Digital Signal Processing by Lonnie C. Ludeman
4. Practical Industrial Data Networks: Design, Installation and Troubleshooting by Steve Mackay, Edwin Wright, Deon Reynders, and John Park; Elsevier Publication

Reference Books :

1. Measurement systems : Applications & Design, by Doeblin
2. Instrumentation measurement & analysis, by Nakra & Chaudhary
3. Mechanical & Industrial Measurement, by R. K. Jain
4. Analogue filter design, by Van Valkenburg
5. Applied Instrumentation in Process Industries, Vol. II, by Andrews
6. Transducers & Instrumentation, by D. V. S. Moorty, 1995.
7. Industrial Instrumentation Fundamentals, by Fribance

INTENDED LEARNING OUTCOMES:

After completing this course students will learn:

- Design and operation of Analog, Digital, Hydraulic & Pneumatic PID Controllers
- Fundamentals and procedure of control valve sizing
- About Signal conditioning and different techniques of the same
- Different telemetering schemes

Dharmsinh Desai University

Faculty of Technology

Department of Instrumentation and Control Engineering

B.TECH. SEMESTER – VI (IC)

ELECTIVE 1: APPLIED INSTRUMENTATION(IC618)

SYLLABUS & SCHEME

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr 15 min)	Practical	T/W	Total
3	1	2	60	40	25	25	150

Section 1: Instrumentation

1. **Controller Modes, Tuning of Controllers**
2. **Control Valve sizing**
3. **Basics of PLC**

Section 2: Virtual Instrumentation

1. **Introduction to Virtual Instrumentation**

- What is VI?
- How to use Computer in VI?
- LABVIEW & Virtual Instrumentation
- Conventional & Graphical Programming

2. **Basics of LabVIEW**

- Components of LABVIEW
- Tools & other Pallets
- Color coding
- Code debugging
- Creating sub – VIs

3. **For and While Loop**

- The FOR & WHILE loop
- Loop Behavior & Inter loop communication
- Local & Global variables

4. **The Structures**
   - Sequence structures
   - Case structures
   - Formula Nodes
5. **Arrays and Clusters**
   - Arrays
   - Clusters
   - Inter conversions of Arrays & Clusters
6. **Charts and Graphs**
   - Wave form charts
   - Resetting plots
   - Use of cursors
   - X-Y graphs
7. **State machines**

- What is a state machine
- A simple state machine
- Event structures
- Full state machine

8. **File input output**

- File formats
- File I/O functions
- Path functions
- File WRITE and READ

9. **String handling**

- String functions
- LABVIEW string formats - Parsing of strings
- Examples

10. Basics of data acquisition

- Classification of signals - Real world signals
- Analog interfacing
- Connecting the signal to the board - Bridge signal source

11. Data acquisition with labVIEW, DAQ and VIs

- Measurement & Automation Explorer - The wave form data type
- Use of simple VIs & DAQmx - Intermediate VIs

12. Interfacing with assistants

- DAQ assist
- Analysis assistants
- Instrument assist

13. Interfacing instruments GPIB and RS 232

- RS 232 vs. GPIB
- Handshaking
- GPIB Interfacing
- RS232c/RS485 Interfacing
- VISA

14. Advanced topics in labVIEW

- Inter process communication - Front panel activity
- Data socket
- Programmatically printing front panels - Use of Dither

15. Introduction to signal processing manipulation

- Sampling considerations - Anti-aliasing filter
- DFT & FFT
- Power spectrum
    - Frequency domain analysis
    - Time domain analysis
    - Signal processing functions

- Filters

Text Book:

1. Virtual Instrumentation using Lab VIEW, by Sanjay Gupta and Joseph John Tata Mc-Graw Hill 2005 Edition

Reference Book/Manual:

Manuals of Lab VIEW 8, supplied by NI with licensed copy

INTENDED LEARNING OUTCOMES:

After completing this course students should be able to:

- Learn new programming concept called Graphical Programming Language with help of LabVIEW (Laboratory Virtual Instrumentation Engineering workbench)
- Understand fundamental concept of analog and digital process control scheme(Proportional, Integral and derivative control)
- Learn different control valve and its application in the process Industry
- Understand application of virtual Instrumentation in process industry, designing stand alone Instrument, simulation of process.
- Learn fundamental LabVIEW Programming concepts like Front Panel objects, Block diagram objects, Loops, Array, clusters, File handling, Graphs and charts
- This subject helps students to carry out various projects using Ardunio development board, Microcontroller and create opportunity to work in the national research center (PRL,IPR,ISRO) etc.
- Learn Interfacing technique with various LabVIEW Hardware(PCI, serial, camera)

B.TECH. SEMESTER – VI (IC)

SUBJECT: INSTRUMENTATION SYSTEM(IC604)

SYLLABUS & SCHEME

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr 15 min)	Practical	T/W	Total
3	1	2	60	40	25	25	150

(A) INTRODUCTION & SYMBOLS:

Introduction to instrumentation system, Standard Instrumentation system symbols, Symbols for Distributed Control Systems, Standard P & I diagrams for typical Instrumentation Systems.

(B) CONTROL ROOM SUPPLY:

Instrument air supply system, Control Room electric supply, Uninterrupted Power Supply, Area Classifications & Safety Standards, Intrinsic safety.

(C) CONTROL ROOMS & PANELS:

Centralized Control Room, Standard Control Panels and Panel Boards, Indicators & Recorders, Annunciators.

(D) DISTRIBUTED DIGITAL CONTROL SYSTEMS:

Introduction, History, Architecture of DCS, Architecture of DCS components – like Process Control Units, Single Loop & Multi Loop Controllers, Man-Machine Interface, Key-board Units, Engineering Unit etc. Typical Graphics Display used in DCS, Architecture of Some popular DCS – Foxboro, Honeywell, Taylor, Yokogawa etc.

Computer networking fundamentals and standards, Communication Protocols, Concept of open architecture, DCS & Field bus, Introduction to OLE and OPC, PC based DCS, SCADA.

(E) INSTALLATION PRACTICE:

Installation Practice for commissioning, maintenance & renovation of a plant. Documents required for installation of instrumentation systems.

Testing of different instruments. Industry Standards & Recommended Practices for the installation & maintenance of various Instrumentation.

(F) SAFETY DEVICES :

Pressure Relief Valves, Rupturing Disc, Flame-Arrester, and Pressure Switch.

(G) Industrial Networking:-

An introduction to network in process Automation, PLC proprietary and open Networks, Hardware Selection for field bus systems, Sorting out the protocols, Overall Field bus trends, Field bus advantages and disadvantages, Field bus design ,installation, Economics and documentation, Instrumentation network design and upgrades, Global System arch technique, Advertiser and limitation of Open Network, HART Network, Foundation Field bus Network, PROFIBUS - PA, Designing PROFIBUS PA and Foundation Festus segments, Ethernet and TCP/IP - Based Systems, Field bus Network Catering to Special Niches of Industries, Proprietary Networks, Fiber Optic Networks, Satellite , Infrared , Radio and Wireless LAN Networks.

NOTE : Installation of various types of instruments to be covered in laboratory (Andrews Vol. II, Page No. 1 to 22)

Text Books:

1) Applied Instrumentation in Process Industries, Vol. I, by Andrews & Williams
2) Instrument Engineer's Handbook (Process Control), by B. G. Liptak
3) Mechanical & Industrial Measurements, 8th Edition, by R. K. Jain
4) Process Instrumentation Handbook, P. R. Shrinivasan
5) Applied Instrumentation in Process Industries, Vol. II, by Andrews & Williams
6) Computer based industrial control, by Krishnakant, 1997 edition

7) Field bus technology : Industrial network standards for real time distributed control by Nitaigour Premchand Mahalik ,Springer (2008)

Reference Books :

1) Applied Instrumentation in Process Industries, Vol. III, by Andrews & Williams
2) Instrumentation, by Kirk & Rimboi
3) Industrial Instrumentation Fundamentals, by A. E. Fribance
4) Foundatoin filedbus overview, National Instruments (May 2003)
5) Foundation fieldbus system engineering guidelines(Foujndation fieldbus)

INTENDED LEARNING OUTCOMES

After completing this course students should be able to:

- Study and learn fundamental and latest concepts of Industrial Automation
- Study and learn industrial and laboratory grade automation and communication technologies
- Study and develop automation system hardware and software
- Study and develop basic and advance automation system design for control of industrial, scientific and research processes for real-time and real-life applications
- Study and learn about Theoretical and Practical Automation System design-development

Dharmsinh Desai University
Faculty of Technology
Department of Instrumentation and Control Engineering

B.TECH. SEMESTER – VI (IC)

SUBJECT: ROBOTICS ENGINEERING(IC609)

SYLLABUS & SCHEME

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr 15 min)	Practical	T/W	Total
3	1	2	60	40	25	25	150

[A] Introduction

Evolution of Robot and Robotics, Laws of Robotics, Progressive advancement in Robot, Robot Anatomy, Human Arm characteristics,

[B] Co ordinate Frames ,Mapping & Transforms

Co ordinate frames, Description of objects in space, Transformation of vectors, Inverting of Homogeneous Transforms, Fundamental rotation Matrices

[C] Modeling of robot –Direct kinematic model

Mechanical structure and notations, Description of links & joints, Kinematic modeling of the manipulator, Denavit- Hartenberg notation, Kinematic relationship between adjacent links Inverse Kinematics

[D] Trajectory planning

Joint space techniques, Cartesian space techniques

[E] Robotic Actuators, sensor & vision

Sensors in robots , Actuators, Kinds of sensors used in Robotics, Robotic vision

[F] Robot Safety, Robot-Economy & installation

Introduction, plant survey, potential safety hazards ,Safety planning check list, safety guidelines

TEXT BOOKS:

(1) Robotics and Control by I.K.Mittal & I.J.Nagrath ,Second reprint 2005 Tata Mc Grawhill

(2) Introduction to robotics by Saeed B.Niku ,first Indian reprint 2002, pearson education

REFERENCE BOOKS:

(1) Robotics by K. S. Fu , R. C. Gonzalez & C.S. G. Lee.

(2) Robotics principles & practice by K.C.Jain & L.N.Aggarwal, khanna publishers 2003 edition

INTENDED LEARNING OUTCOMES:

After completion of the course students should be able to:

- Describe the history and evolution of robotics engineering
- Describe the kinematic modeling of a manipulator arm
- Describe vision sensors used for intelligent robots
- Describe various industrial applications of robots

Dharmsinh Desai University
Faculty of Technology
Department of Instrumentation and Control Engineering

B.TECH. SEMESTER – VI (IC)

SUBJECT : AUTOMATION SYSTEM INTEGRATION(IC614)

SYLLABUS & SCHEME

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr 15 min)	Practical	T/W	Total
3	1	2	60	40	25	25	150

[A] Programmable Logic Controller

1. **The PLC: A Over all look**
   - -Introduction
   - -Manufacturing and assembly process
   - -PLC advantages and Disadvantages
   - -Overall PLC system
   - -CPU and Programmers
   - -PLC Input/Output modules
   - -Solid state memory
2. **General PLC programming Procedures**
3. **Devices connected with PLC I/O modules**
   - -Input/output on/off switching devices
   - -Input/output Analog devices
4. **Programming on/off inputs to produce on/off outputs**
5. **Relation to digital gate logic to contact/coil logic**
6. **Creating ladder diagrams from process control descriptions**
7. **PLC Basic functions**
   - -PLC timer, counter, arithmetic functions
8. **PLC Intermediate functions**
   - -PLC Number comparison functions
   - -Numbering systems and PLC number conversion func

9. Data Handling Functions

- PLC skip and master control relay functions
- JUMP functions
- PLC data moves systems

10. PLC functions working with bits.

- Digital bits, Sequential, controlling a robot with PLC, Matrix functions

11. Advanced PLC functions

- Analog PLC operations, PID control of continuous process, networking of PLCs

12. PLC Installation, Trouble shooting and maintenance

[B] PLC Auxiliary Commands and Functions

Monitor Mode function, Force mode function, functions for different programming formats, print functions, Selection of PLC, Industrial control and rise of PLC, PLC versus PC, factors to consider in selecting a PLC

[C] PLC Installation Practices

Installation Practices, Consideration of the operating environment, receiving check, testing and assembly, electrical connections, grounding and suppression considerations, circuit protection and wiring, troubleshooting PLC malfunctions, PLC maintenance

[D] Data Acquisition System

Introduction of Data Acquisition system, sampling concept, digital to analog converters, analog to digital converters, Blockdiagram, Protections in DAS, Isolation in DAS, Data Acquisition Configuration.

Data Acquisition system using GPIB

Introduction, overview of GPIB, GPIB systems, Implementation, GPIB signals, GPIB protocol, Data Acquisition system using Serial Interface, Introduction, Serial Communication, communication formats, error checking, encoding, communication modes, Serial interface standards, Rs-232, Rs-422, Rs-485, USB, IEEE1394

[E] Integration of Automation system

Introduction, levels of Industrial Control, Types of Networking, Network Communication, PLC and the Internet, Cell control by PLC networks, Hierarchy model of industrial automation, network data communication, Local area networks and its characteristics, Network Devices, Field buses, Profibus, Modbus, FFB

[F] System Integrity Level in Automation Systems :

Conceptual design stage, ISA conceptual design stage, IEC 615108 on conceptual design, skills and resources, basic SIS configuration, shared functions, technology choices, pneumatics, relays, safety relay, solid state systems,

[G] Safety PLC:

Programmable systems for the logic solver, upgrading of PLCs for safety applications, characteristics of safety PLCs, hardware characteristics of safety PLC, software characteristics of safety PLC, design of safety PLC, Triple Modular Redundant (TMR) systems, safety PLC with 1oo3 architecture, communication features of safety controllers, classification and certification , SIS architecture conventions

[H] Introduction and basics of SCADA and SCADA Configuration

Advance configuration of WONDERWARE SCADA
Detail study of SCADA configuration building blocks

Text Books:

1. Programming Logic Controllers- Principles and applications, By John W. Webb & Ronald Reis, PHI, fifth Edition (2006)
2. PC based Instrumentation – Concepts and practice By N.Mathivanan, PHI, 2007 Edition
3. Practical Industrial safety, Risk Assessment and Shutdown Systems by- Dave Macdonald,

References:

1. L.R. on “Wonder ware” supplied by Dynalog
2. Modicon MODBUS protocol reference guide, Modicon
3. User manual for Wonderware InTouch SCADA development software
4. Programming Logic Controllers- Programming methods and applications By John R. Hackworth & Frederick D. Hackworth Jr. , Pearson Education, Low Price Edition
5. Programming Logic Controllers and Industrial Automation – An Introduction, By Madhu chhanda, Samarjit sen Gupta, Tata Mc Graw Hill
6. Process Control Instrumentation By C. D. Johnson,
7. Digital measurement techniques, by- T. S. Rathore, Narosa, New Delhi, 1996.
8. Instrument Engineers Handbook, third edition, volume-III, Process Software and Digital Networks, by- Bela G.Liptake, CRC Press,

9. Field bus Technology : Industrial network standards for real time distributed control by
Nitaigour Premchand Mahalik ,Springer (2008)

Recommended manuals:

1. Statement List STL S7-300 and S7-400 programming for Siemens PLC –Ref. Manual pdf
2. Statement list Allen Bradley Micro logix 1000 & 1200 – Ref Manual-pdf

INTENDED LEARNING OUTCOMES

After completing this course students should be able to:

- Describe the features of Automation Concept
- Describe basics of Programmable Logic Controllers and SCADA systems
- Do programming for PLC and SCADA Systems
- Describe various features and standards used for industrial networking

Dharmsinh Desai University
Faculty of Technology
Department of Instrumentation and Control Engineering

B.TECH. SEMESTER – VII (IC)

SUBJECT: ADVANCED CONTROL THEORY(IC701)

SYLLABUS & SCHEME

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr 15 min)	Practical	T/W	Total
3	1	2	60	40	25	25	150

[A] SAMPLED DATA CONTROL SYSTEMS:

Introduction, The Z transform, The Z transfer function, The inverse Z transform, The Z transform analysis of sampled data control systems, Stability analysis.

[B] STATE VARIABLE ANALYSIS:

Introduction, State modes of linear continous-time systems, Diagonalization, Solutions of state equations, Concept of controllability & Observability, Liapunov's stability criteria.

[C] OPTIMAL CONTROL SYSTEMS:

Introduction, Parameter optimization, optimum control problem- T.F. approach & State variable approach, State regulator problem, Parameter optimizations.

[D] NON LINEAR SYSTEMS:

Introduction, Common physical nonlinearities, The phase – plane mehods, Singular points, Construction of phase – trajectories.

The describing – function method, Derivation of DFS, Stability analysis by D.F. method, Jump resonance phenomena.

Text Books:

(1) Contorl system engg. By Nagarath & Gopal.

(2) Modern control engg. By Ogata.

Reference Books:

(1) State space analysis of control system by Ogata

(2) Morden control theory by J. T. Tou.

(3) Morden control system theory by M. Gopal.

(4) Nonlinear automatic control by Gibson.

INTENDED LEARNING OUTCOMES:

After completing this course students will learn:

- State variables, state model and state variable analysis techniques
- Parameter optimization and optimal control problems
- Non linear systems and their stability analysis
- Sampled data control , z-transform and stability analysis

Dharmsinh Desai University
Faculty of Technology
Department of Instrumentation and Control Engineering

B.TECH. SEMESTER – VII (IC)

SUBJECT: SYSTEM DESIGN(IC702)

SYLLABUS & SCHEME

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr 15 min)	Practical	T/W	Total
3	1	2	60	40	25	25	150

[**A] SYSTEM COMPENSATION:**

Introduction, Linear Servo Analysis, Trial & Error method, Analytical & Optical Method of Synthesis, Root Locus Techniques, Compensation Techniques, Minor-loop Design of Control System, Design of Control Systems with State Variable Feedback.

[B] NETWORK SYNTHESIS:

Introduction, Positive Real Function, Testing of Drive Point Function, Synthesis of One Port LC, RL, RC, & RLC passive networks.

Text Book:

1) Modern Network Synthesis By Van Vulkenburg
2) Control System Engineering By Nagrath & Gopal
3) Introduction to Control System Design By Eveleigh
4) Contol System Theory BY Elegerd

Reference Book:

1) Network Theory & Filter Design By Vausdev Atre.
2) Network Analysis & Design By Guillemin
3) Linear Control System (Analysis & Design conventional & Modern) By D'azzo & Houpis.
4) Design of Feedback System By Thaler G. J.

INTENDED LEARNING OUTCOMES:

After completion of the course students should be able to:

- Design and compensate a control system for given specifications using root locus technique and Bode plot.
- Synthesize a system network based on the driving point impedance functions.
- Describe positive real functions and their characteristics.
- Design a control system with State Variable Feedback.

Dharmsinh Desai University

Faculty of Technology

Department of Instrumentation and Control Engineering

B.TECH. SEMESTER – VII (IC)

SUBJECT: PROCESS CONTROL(IC703)

SYLLABUS & SCHEME

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr 15 min)	Practical	T/W	Total
3	1	2	60	40	25	25	150

[A] INTRODUCTION TO PROCESS CONTROL AND FUNDAMENTAL CONCEPTS:

(1) Introduction to Process Control

(2) Evolution of Process Control

(3) Laplace Transform in Process Control

(4) Open loop v/s Closed loop systems

(5) Open loop response of Simple Systems

(6) Feedback v/s Feed Forward Control Configuration

[B] STUDY OF OPEN LOOP RESPONSE OF SYSTEM AND ANALYSIS

(1) Open loop response of simple systems

(2) Complex Control Systems

(3) Steps in synthesis of a control system

[C] STUDY OF TRANSIENT RESPONSE OF SYSTEM AND CONTROL DYNAMICS

(1) Transient response of control systems

(2) Level Control

[D] CONTROL OF UNIT OPERATIONS:

Boiler Controls, Distillation Column Controls, Compressor Controls, Steam Turbine Controls, Heat Exchanger Controls

[E] CONTROL SCHEMES:

Ratio Control, Cascade Control, Feed-Forward Control, Selector Control, Inverse Derivative Control, Split Range Control, etc.

[F] ADVANCED PROCESS CONTROL:

Advance Control Systems – Adaptive Control, Adaptive Control Configurations, Valve Position Control (VPC), Model Reference Adaptive Control (MRAC), Self Tuning Regulator (STR), Intelligent Control and Artificial Intelligence (AI), Features of Intelligent Control, Definition of AI, Introduction to Artificial Neural Networks (ANN) and Fuzzy Logic Control (FLC)

TEXT BOOKS:

1. Process Control, by Peter Harriot
2. Applied Instrumentation in Process Industries, Vol. I, by Andrews & Williams
3. Process Control–Principles and Applications by Surekha Bhanot, Publisher: Oxford University Press (2008), India.
4. Principles of Process Control by Patranabis
5. Automatic Control of Power & Process by Manifold
6. Instrument Engineer's Handbook – Process Control, by Bela G. Liptak (Liptak-II)
7. Process Modeling, Simulation & Control for Chemical Engineers by W. Luyben
8. Chemical Process Control by Stephanopoulos

REF. BOOKS:

1. Process Control, by Pollard
2. Principal of Industrial Measurement by Patranabis
3. Applied Instrumentation in Process Industries, Vol. II, by Andrews & Williams
4. Chemical Process Control by Shinskey
5. Chemical Process Control by Coughnour & Copel

INTENDED LEARNING OUTCOMES

After completing this course students should be able to:

- Study and learn fundamental and latest concepts of Industrial Process Control
- Study and learn industrial and laboratory grade process control and tuning techniques
- Study and develop process control system hardware and software
- Study and develop basic and advance process control strategies for control of rapid, complex and difficult to regulate reactions and processes
- Study and learn about Theoretical, Simulation based and Practical Laboratory based Process Control System design-development using Control Engineering Concepts

Dharmsinh Desai University
Faculty of Technology
Department of Instrumentation and Control Engineering

B.TECH. SEMESTER – VII (IC)

SUBJECT: INDUSTRIAL ELECTRONICS(IC707)

SYLLABUS & SCHEME

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr 15 min)	Practical	T/W	Total
3	1	2	60	40	25	25	150

(A) INDUSTRIAL DEVICES & APPLICATIONS :

Polyphase Rectifiers, Resistance Welding, Power Amplifiers and R. F. Heating, Industrial Timer Circuits.

(B) CONVERTERS & INVERTERS:

Thyristor Converters & Inverters, D. C. Choppers, Cycloconvertors.

(C) DRIVES:

Thyristor controlled DC Drives, Thyristor Controlled AC Drives, Advances in Drives, Specifications of a typical drives.

(D) ULTRASONICS:

Introduction, Generation & applications of ultrasonic waves, Action & effects of ultrasonic waves, Soldering, Welding & drying by ultrasonic wawes.

NOTE : Numerical Examples & Objective questions should be prepared from textbooks.

Text Books :

1) A Text book on Power Electronics – Devices, Circuits, Systems and Applications, 2nd Edition, by Dr. H. C. Rai
2) Industrial Electronics, 11th Edition, by G. K. Mithal
3) Power Electronics By: M.D. Singh, K.B. Khandchandani
   Tata Mcgrawhill, 2nd Edition

Reference Books :

1) Calculations in Industrial Electronics and Instrumentation, by V. K. M. John
2) Engineering Electronics, by John D. Ryder
3) Thyristor Engineering, by M. S. Berde
4) Power Electronics, by P. C. Sen
5) Thyristor : Theory and Applications, by R. K. Sugandhi & K. K. Sugandhi

INTENDED LEARNING OUTCOMES:

After completing this course students should be able to:

- Understand the various applications of Power Semiconductor Devices like battery charger, UPS, HVDC, SMPS, Delay Circuits etc.
- Understand the application of Induction heating & Dielectric Heating
- Understand differentiate types of resistive welding
- Understand chopper & inverter
- Understand Cycloconverter & Dualconverter
- Understand DC & AC Drive

Dharmsinh Desai University
Faculty of Technology
Department of Instrumentation and Control Engineering

B.TECH. SEMESTER – VII (IC)

SUBJECT: BIOMEDICAL INSTRUMENTATION(IC708)

SYLLABUS & SCHEME

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr 15 min)	Practical	T/W	Total
3	1	2	60	40	25	25	150

Measurement, Recording and Monitoring:

1. Fundamentals of Medical Instrumentation
   Anatomy and Physiology
   Physiological system of Body
   Sources of Biomedical Signals
   Basic Medical Instrumentation System
   Performance requirement of Medical Instrument system
   General Constraints of Medical Instrument system
   Regulations of Medical Devices
2. Bioelectric signals and Electrodes
   Origin of Bioelectric signals
   Recording Electrodes
   Electrodes for ECG,EEG,EMG
   Electrical conductivity of electrodes jellies and creams
   Microelectrodes, Skin surface electrodes and needle electrodes
3. Recording systems
   Basic recording system
   General considerations for signal conditioners
   Preamplifiers
   Sources of noise in low level measurement

Biomedical signal analysis techniques

Signal processing techniques

The main amplifier and driver stage

Different types of recorders

VCG,PCG,EEG,EMG,ECG

4. Patient monitoring Systems:

   System concepts

   Cardiac monitor

   Bedside Patient Monitoring system

   Central Monitors

   Measurement of Heart Rate

   Measurement of Blood Flow

   Measurement of Pulse Rate

   Blood Pressure Measurement

   Measurement of Temperature

   Measurement of Respiration rate

   Catherization lab instrumentation

5. Arrhythmia and Ambulatory Monitoring Instruments:

   Cardiac Arrhythmias

   Arrhythmia Monitor

   QRS Detection Technique

   Ambulatory Monitoring Technique

6. Cardiac O/P measurement:

   Indicator Dilution method

   Dye Dilution method

   Thermal Dilution method

   Impedance Technique

   Ultrasound Method

7. Pulmonary Function Analyzers:

   Pulmonary Function measurement

   Spiro meter

   Pneumo tachometer

   Measurement of Volume

   Respiratory gas analyzer

Modern Imaging Systems:

8. X-Ray Machines and Digital Radiography:

   X-Rays, X-Rays Machine

   X-Ray Computed Tomography

   Nuclear Medical Imaging Systems

   Emission Computed Tomography (ECT)

   Single Photon Emission Computed Tomography (SPECT)

   Positron Emission Tomography (PET)

   Magnetic Resonance Imaging (MRI)

9. Ultrasonic Imaging Systems:

   Diagnostic Ultrasound

   Physics of Ultrasonic waves

   Medical Ultrasound

   Basic Pulse echo apparatus

   A- scan, Echocardiograph

   Real time Ultrasonic Imaging Systems

   Biological effects of ultrasound

Therapeutic Equipments:

10. Cardiac Pacemakers:

    Need for Cardiac Pacemakers

    External Pacemakers

    Implantable Pacemakers

    Recent Development in Pacemakers

11. Cardiac Pacemakers:
    - Need for Cardiac defibrillator
    - DC Defibrillator
    - Implantable Defibrillator
    - Pacer-Cardioverter-Defibrillator
12. Instruments for Surgery:
    - Surgical Diathermy
    - Surgical Diathermy Machine
    - Safety aspects in Surgical Diathermy machine
    - Surgical Diathermy Analyzers
13. LASER Application in Biomedical Engineering:
    - What is LASER ?
    - Different types of LASER
    - Effects of Tissues and related issues
    - Selection of LASER for surgery
    - Application in different areas
    - Safety Aspects
14. Physiotherapy and Electrotherapy Equipments:
    - Shortwave Diathermy
    - Microwave Diathermy
    - Ultrasonic Diathermy
    - Pain relief through Electrical Stimulation
15. Haemodialysis machine:
    - Function of Kidneys
    - Artificial Kidneys
    - Dialyzer
    - Haemodialysis machine

16. Electrical Safety of Medical Equipment:
    Physiological effect of electrical current
    Shock hazard form electric equipment
    Methods of accident prevention
17. Latest Issues in BME:
    Biomaterials
    Telemedicine
    Artificial heart, eye
    Orthopedics Mechanics

Text Books:

1) Hand book of Biomedical Instrumentation by R. S. Khandpur.
2) Biomedical Instrumentation and measurement by Cromwell, Weibell & Preiffer.

Reference Books:

1) Introduction to Biomaterials- by Sujata Bhatt (Narosa Publishing House)
2) Introduction to Biomedical Equipment Technology- Joseph Carr and John Brown (Pearson Education)
3) Biomedical Digital signal Processors- Wills J. Tompkins (PHI)
4) Medical Instrumentation- Application and Design- John G. Webster (Wiley Student Edition)

INTENDED LEARNING OUTCOMES:

After completing this course students should be able to:

- Describe the features and use of all types Biomedical Instruments like ECG, EEG, EMG, Treadmill Test, Pacemakers, Ultrasound Scanner, Telemetry etc.
- Describe the features and use instrumentation in Biomedical field.
- Explain the different methods for blood pressure, blood flow, heart rate, PO2, ECG, EEG measurement.
- Explain the different physiological systems of body & make awareness about its importance.

Dharmsinh Desai University
Faculty of Technology
Department of Instrumentation and Control Engineering

B.TECH. SEMESTER – VII (IC)

SUBJECT: INDUSTRIAL EXPOSURE & PRACTICE(IC716)

SYLLABUS & SCHEME

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr 15 min)	Practical	T/W	Total
--	--	6	--	--	25	25	50

B.TECH. SEMESTER – VIII (IC)

SUBJECT: SEMINAR(AF802)

SYLLABUS & SCHEME

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr 15 min)	Practical	T/W	Total
--	--	8	--	100	--	--	100

B.TECH. SEMESTER – VIII

SUBJECT: PROJECT/INDUSTRIAL TRAINING (AF801)

SYLLABUS & SCHEME

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr 15 min)	Practical	T/W	Total
--	--	28	--	--	300	100	400

The students will undertake project work for the period of one semester. They should design/develop & fabricate the project.

They are supposed to prepared and submit a project report as a part of their term-work for the project and give seminars on their project work. The students may be sent to the industry for their project and they are to timely report to the department regarding monitoring and necessary guidance.

They should arrange for demonstration of the project work at the time of examination They are to be examined based on viva and/or demonstration.