Complete Course Grid and Syllabus

Department of Electronics and Instrumentation Engineering

From Academic Year 2020-2021

Course Grid for Diploma in Electronics and Instrumentation Engineering
Assam Energy Institute, Sivasagar
Rajiv Gandhi Institute of Petroleum Technology, Jais, Amethi

Course: Diploma in Electronics and Instrumentation Engineering

Total Number of Credits:366

SEMESTER I					
Subject Code	**Subject**	**L**	**T**	**P**	**Credits**
IS101	Mathematics-I	3	1	0	11
IS102	Physics-I	3	1	0	11
IS103	Chemistry-I	2	1	0	8
IE101	Engineering Thermodynamics	3	1	0	11
IE102	Fundamentals of Computer Engineering	2	0	2	8
EP101	Engineering Drawing	0	0	3	3
EP102	Engineering Workshop Practice	0	0	3	3
IS102L	Physics Lab	0	0	2	2
	TOTAL				**57**
HU101	Universal Human Values	1	1	0	**5**
LM101	Communication Skills*	2	0	1	**7**

SEMESTER II					
Subject Code	**Subject**	**L**	**T**	**p**	**Credits**
IS104	Mathematics-II	3	1	0	11
IS105	Physics-II	3	1	0	11
IS106	Chemistry-II	3	0	0	9
IE103	Fundamentals of Mechanical Engineering	2	0	0	6
IE104	Fundamentals of Electrical & Electronics Engineering	3	1	2	13
IE105	Computer Programming	2	0	2	8
IS106L	Chemistry Lab	0	0	2	2
	TOTAL				**60**
HU102	Community Internship	1	1	0	**5**

SEMESTER III					
Subject Code	**Subject**	**L**	**T**	**P**	**Credits**
DC 201	Electronic Circuits	3	1	0	11
DC 202	Analog Electronics	3	1	2	13
DC 203	Transducer & Application	3	0	2/2	10
DC 204	Principles of Instrumentation	3	0	0	9
DC 205	Principles of Digital Electronics	2	1	0	8
IS 201	Numerical Methods	2	1	0	8
					59

SEMESTER IV					
Subject Code	**Subject**	**L**	**T**	**p**	**Credits**
DC 206	Linear Integrated Circuits	3	0	0	11
DC 207	Digital Electronics	3	0	2/2	10
DC 208	Basics of Control System	3	0	0	9
DC 209	Electronic Instruments and Measurements	3	0	2	11
DC 210	Principles of Communication Engineering	3	1	0	11
DP 201	Project	0	0	5	5
	TOTAL				**57**
DP 202	Industrial training	0	0	5	5

SEMESTER V					
Subject Code	**Subject**	**L**	**T**	**P**	**Credits**
DC301	Microprocessors & Applications	3	0	2/2	10
DC302	Power Electronics	3	0	2/2	10
DC303	Industrial Process control & Instrumentation	3	0	0	9
DC304	Optical Fiber Engineering	2	0	0	6
LM301	Engineering Economics	2	1	0	8
HU301	Humanities	2	0	0	6
DP301	Project	0	0	10	10
TOTAL				**59**	

SEMESTER VI					
Subject Code	Subject	L	T	p	Credits
DC 305	Computer aided PCB Design	3	0	2/2	9
DC 306	Embedded System	2	0	0	6
DC 307	Industrial Automation	3	0	0	9
DC 308	Programing for Embedded System	2	0	2/2	7
DE 301	Departmental Elective	3	0	0	9
OE 301	Open Elective	3	0	0	9
DP 302	Project	0	0	10	10
TOTAL				59	

Department Elective:

Biomedical Electronics&Instrumentation
Advanced Microcontrollers
Advance Microprocessors & Interface
Analytical Instrumentation
Troubleshooting of Electronic Equipment

Cat.		Diploma in Electronics & Instrumentation Engineering		Min
HU		Humanities and Social Science		16
IS		Basic Science		73
IE		Institute Requirement Engineering		46
EP		Engineering Drawing (Manual and Computer Aided), Manufacturing Practices and Practice course of Department		6
LM		Language and Management		8
DC		Departmental Core		169
DE		Departmental Elective		9
OE		Open Elective		9
DP		Project/ Industrial visit/ Training		30
		Total		366

<u>Syllabus</u>

Subject Code	Subject Name	Credit Lecture (L-T-P)			Total Credits
IS101	Mathematics-I	3	1	0	11

Unit-I: Complex Numbers:

Definition of Complex numbers; Real and imaginary parts of a Complex number; Polar and Cartesian form of a complex number and its conversion from one form to other; Conjugate of a complex number; Modulus and amplitude of a complex number; Addition, Subtraction, Multiplication and Division of complex numbers. De-Movier's theorem and its application.

Unit-II: Partial fractions:

Definition of polynomial proper fraction & improper fractions and definition of partial fractions; To resolve proper fraction into partial fraction with denominator containing non-repeated linear factors, repeated linear factors and irreducible non-repeated quadratic factors; To resolve improper fraction into partial fraction.

Unit-III: Permutations and Combinations:

Fundamental principle of counting: Fundamental principle of multiplication, Fundamental principle of addition; Factorial notation; Permutations; Combinations; Practical problems on permutations and combinations.

Unit-IV: Binomial theorem:

Binomial theorem (without proof) for positive integral index ; General and middle term in Binomial expansion; Binomial theorem for any rational number (without proof); Simple applications

Unit-V: Trigonometry:

Concept of angle; Measurement of angle in degree, grades and radians and their conversations; Trigonometric ratios; Sum, difference formulae and their applications (Without proof); Product formula (Transformation of Product to Sum and Differences and vice versa); Trigonometric Ratios of multiple angle, sub-multiple angles (2A,3A,A/2); Graph of sinx, cosx, tanx, cosecx, secx and cotx.

Unit-VI: Differential Calculus

Definition of function; Concept of limits; Four standard limits $\lim_{x \to a} \frac{x^n - a^n}{x - a}, \lim_{x \to 0} \frac{\sin x}{x}, \lim_{x \to 0} \frac{a^x - 1}{x} \, and \lim_{x \to 0} (1 + x)^{1/x}$. Differentiation by definition of $x^n, \sin x, \cos x, e^x \, and \log_a x$. Differentiation of sum, product and quotient of functions; Differentiation of function of a function; Differentiation of trigonometric and inverse trigonometric functions; Logarithmic differentiation; Exponential functions.

TEXT BOOKS:-

1. B.S. Grewal, Higher Engineering Mathematics, Khana Publishers, New Delhi, 40th Edition,2007.
2. Murray R. Spiegel, Robert E. Moyer, College Algebra, Tata McGraw Hill, New Delhi, 2nd Edition,2000.

REFERENCE BOOKS:-

1. G. B. Thomas, R.L. Finey, Calculus and Analytical Geometry, Addision Wesley, 9th Edition,1995
2. Frank Ayers, Elliot Mendelson, Calculus, McGraw Hill, New York, 4th Edition.

Subject Code	Subject Name	Credit Lecture (L-T-P)			Total Credits
IS102	Physics-I	3	1	0	11

Unit 1: Physical world, Units and Measurements

Physical quantities; fundamental and derived, Units and systems of units (FPS, CGS and SI units).

Dimensions and dimensional formulae of physical quantities, Principle of homogeneity of dimensions, Dimensional equations and their applications (conversion from one system of units to other, checking of dimensional equations and derivation of simple equations), Limitations of dimensional analysis.

Measurements: Need, measuring instruments, least count, types of measurement (direct, indirect), Errors in measurements (systematic and random), absolute error, relative error, error propagation, error estimation and significant figures.

Unit 2: Force and Motion

Scalar and Vector quantities – examples, representation of vector, types of vectors.Addition and Subtraction of Vectors, Triangle and Parallelogram law (Statement only), Scalar and Vector Product, Resolution of a Vector and its application to inclined plane and lawn roller.

Force, Momentum, Statement and derivation of conservation of linear momentum, its applications such as recoil of gun, rockets, Impulse and its applications.

Circular motion, definition of angular displacement, angular velocity, angular acceleration, frequency, time period, Relation between linear and angular velocity, linear acceleration and angular acceleration (related numerical), Centripetal and Centrifugal forces with live examples, Expression and applications such as banking of roads and bending of cyclist.

Unit 3: Work, Power and Energy

Work: Concept and units, examples of zero work, positive work and negative work.

Friction: concept, types, laws of limiting friction, coefficient of friction, reducing friction and its engineering applications, Work done in moving an object on horizontal and inclined plane for rough and plane surfaces and related applications.

Energy and its units, kinetic energy, gravitational potential energy with examples and derivations, mechanical energy, conservation of mechanical energy for freely falling bodies, transformation of energy (examples).

Power and its units, power and work relationship, calculation of power (numerical problems).

Unit 4: Rotational Motion

Translational and rotational motions with examples, Definition of torque and angular momentum and their examples, Conservation of angular momentum (quantitative) and its applications.

Moment of inertia and its physical significance, radius of gyration for rigid body, Theorems of parallel and perpendicular axes (statements only), Moment of inertia of rod, disc, ring and sphere (hollow and solid); (Formulae only).

Unit 5: Properties of Matter

Elasticity: definition of stress and strain, moduli of elasticity, Hooke's law, significance of stress-strain curve.

Pressure: definition, units, atmospheric pressure, gauge pressure, absolute pressure, Fortin's Barometer and its applications.

Surface tension: concept, units, cohesive and adhesive forces, angle of contact, Ascent Formula (No derivation), applications of surface tension, effect of temperature and impurity on surface tension.

Viscosity and coefficient of viscosity: Terminal velocity, Stoke's law and effect of temperature on viscosity, application in hydraulic systems.

Hydrodynamics: Fluid motion, stream line and turbulent flow, Reynold's number Equation of continuity, Bernoulli's Theorem (only formula and numerical) and its applications.

Unit 6: Heat and Thermometry

Concept of heat and temperature, modes of heat transfer (conduction, convection and radiation with examples), specific heats, scales of temperature and their relationship, Types of Thermometer (Mercury thermometer, Bimetallic thermometer, Platinum resistance thermometer, Pyrometer) and their uses.

Expansion of solids, liquids and gases, coefficient of linear, surface and cubical expansions and relation amongst them, Co-efficient of thermal conductivity, engineering applications.

TEXT BOOKS:-

1. Text Book of Physics for Class XI& XII (Part-I, Part-II); N.C.E.R.T., Delhi

REFERENCE BOOKS:-

1. Applied Physics, Vol. I and Vol. II, TTTI Publications, Tata McGraw Hill, Delhi.
2. Concepts in Physics by HC Verma, Vol. I & II, BhartiBhawan Ltd. New Delhi
3. Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi
4. Engineering Physics by DK Bhhatacharya&PoonamTandan; Oxford University Press, New Delhi.
5. Comprehensive Practical Physics, Vol, I & II, JN Jaiswal, Laxmi Publications (P) Ltd., New Delhi
6. Practical Physics by C. L. Arora, S. Chand Publication.
7. E-books/e-tools/ learning physics software/websites etc.

Subject Code	Subject Name	Credit Lecture (L-T-P)			Total Credits
IS 103	Chemistry-I	2	1	0	8

Unit – 1: States of matter

States of matter, Gas laws, Ideal gas equation, Gas constant, Dalton's law of partial pressure, Grahm's law of diffusion, Avogadro's hypothesis and its applications, Mole concept and problems, Standard solution, normal solution and molar solution, concentration terms-normality, molarity, gm/l, ppm, normality equation, acid-base titration.

Unit – 2: Chemical equation

Chemical equation-definition, qualitative and quantitative significance, limitations, balancing by partial and ion-electron method, electronic concept of oxidation and reduction, Stoichiometric calculations.

Unit – 3: Acids, bases and salts

Acids, bases and salts, Theories of acids and bases- Arrhenius, Bronsted-Lowry, Lewis theory, Strong acids and strong bases, conjugate acid-base pair, classification of salts, hydrolysis of salts and its effect.

Unit – 4: Atomic structure

Atomic structure: Rutherford's Model, Bohr's Model, Atomic spectra, Dual nature of electron, uncertainty principle, Quantum number, Aufbau principle, Hund's rule, Pauli's exclusion principle, electronic configuration.

Unit – 5: Modern Periodic table

Modern Periodic table, Periodic properties, size of atoms (atomic and ionic radii), Ionization energies, electron affinity, electro-negativity, Basic Concepts of s,p,d and f- block Elements.

Unit – 6: Chemical bonding

Chemical bonding: electronic theory of valency, Ionic, covalent and co-ordinate covalent bonds, characteristics of ionic and covalent compounds, Hydrogen bonding.

Unit-7: Chemical equilibrium

Chemical equilibrium: Law of mass action, equilibrium constant, factors effecting equilibrium, Le-Chatellier's principle and its applications, ionic equilibrium, pH value, dissociation of acids and bases, common ion effect, buffer solution, solubility product and its applications.

Unit-8: Electrolysis

Electrolysis: Laws of electrolysis, problems, Industrial application of electrolysis (extraction and purification of metals, electroplating and galvanization).

Unit-9: Catalysis

Catalysis: Definition, type of catalyst, industrial applications of catalysis in manufacture of

NH_3, H_2SO_4 by contact process, cracking.

Unit-10: Water

Water: Causes of hardness of water, removal of hardness by permutite process, de-ionisation of water, effect of water in boiler preparation of boiler-feed water, preparation of Municipal water with block-diagram, Estimation of hardness of water

SUGGESTED READINGS:

TEXTBOOKS:

1. NCERT Text book (Class XI and XII)
2. Engg. Chem, B. K. Sharma
3. A Text Book Of Engineering Chemistry, SashiChawla
4. Engineering Chemistry, Jain and Jain
5. Applied Chemistry, Dr. Raman Rani Mittal

REFERENCE BOOKS:

1. Physical Chemistry: Peter Atkins, Julio De. Paula
2. Concise Inorganic Chemistry: J. D. Lee

Subject Code	Subject Name	Credit Lecture (L-T-P)			Total Credits
IE101	Engineering Thermodynamics	3	1	0	11

Unit-I: Basic conceptsanddefinition

Scope of Thermodynamics, Macroscopic and Microscopic approaches; Definition of Fixed mass (closed systems) and Control volume(open system), Properties (extensive and Intensive), State and its representation on a property diagram, Process and its representation, Cyclic process (or cycle) and its representation, Carnot Cycle, Otto Cycle, Diesel Cycle, Dual Cycle, Rankine Cycle, Brayton Cycle, Characteristics of properties (point and path function);Reversible and Irreversible processes; Thermal, mechanical and Chemical equilibrium, Thermodynamic equilibrium, Zeroth Law of Thermodynamics and temperature, Measurement of temperature and calibration of Thermometers, the ideal gas temperature scale, Measurement of pressure, Bourdon pressure gage and manometers, gage and absolutepressure.

Unit-II: Ideal Gases

Ideal gases and their P-V-T relations, Gas mixtures. Work Transfer (definition and calculation), Different modes of work, Displacement Work for various process, Heat Transfer; Modes of heat transfer, Basic laws in conduction, convection and radiation, combined modes of heat transfer with examples.

Unit-III: First LawofThermodynamics

Formal statement (using cyclic processes), First law for processes of fixed masses(closed systems) and introduction of internal energy as a thermodynamics property, Introduction of enthalpy as a thermodynamic property; Definition of specific heats and their use in calculation of internal energy and enthalpy with emphasis on idealgases.

Application of First Law to control volumes; Nozzle, Diffuser, Compressor, Turbine, Throttling device, Heat Exchanger.(only steady flow need beconsidered)

Unit- IV: Second LawofThermodynamics

Kelvin- Planck and Clausius statements of Second Law, Reversible and irreversible engines and their efficiency, Entropy concepts and the principle of entropy increase.

Unit- V: Properties ofPureSubstances

P-V, P-T, T-S, H-S diagram for steam, different types of steam, Introduction to steam tables with respect to specific volume, pressure, temperature, enthalpy andentropy.

Unit-VII: Applicationofthermodynamics

Air compressors, steam power plant, Refrigerators and Heat pump, I.C. Engines (Brief description of

different components of above mentioned systems and working principles with Schematic diagramonly)

TEXT BOOK(S):

1. Engineering Thermodynamics by P.K.Nag, Publisher:TMH
2. Basic Engineering Thermodynamics by Rayner Joel, PearsonEducation

REFERENCE BOOK(S):

1. Engineering Thermodynamics by Van Wylen and Sontang, JohnWiley
2. Engineering Thermodynamics by M.Achuthan, Publisher:PHI
3. Applied Thermodynamics by Eastop and McConkey, Publisher:Pearson
4. Fundamental of Engineering Thermodynamics by E. Rathakrishnan, publisher.PHI
5. Engineering Thermodynamics by Russel and Adebiyi, publisher,Oxford
6. Steam Tables in SI Units by Ramalingam,Scitech.

Subject Code	Subject Name	Credit Lecture (L-T-P)			Total Credits
IE102	Fundamentals of Computer Engineering	2	0	2	8

UNIT 1:

Basic Internet skills: Understanding browser, efficient use of search engines, awareness about Digital India portals (state and national portals) and college portals.

General understanding of various computer hardware components – CPU, Memory, Display, Keyboard, Mouse, HDD and other Peripheral Devices.

UNIT 2:

OS Installation (Linux and MS Windows), Unix Shell and Commands, vi editor.

UNIT 3:

HTML4, CSS, making basic personal webpage.

UNIT 4:

Office Tools: OpenOffice Writer, OpenOffice Spreadsheet (Calc), OpenOffice Impress.

UNIT 5: Information security best practices.

Class lectures will only introduce the topic or demonstrate the tool, actual learning will take place in the Lab by practicing regularly.

SUGGESTED LAB WORK:

This is a skill course. Topics/concepts taught in the class should be practiced in the Lab same week and practiced regularly during the semester till student becomes confident about it. This course is all about some theory and a lot of practice.

RECOMMENDED BOOKS:-

1) R.S. Salaria, Computer Fundamentals, Khanna Publishing House.
2) Ramesh Bangia, PC Software Made Easy – The PC Course Kit, Khanna Publishing House.
3) Online Resources, Linux man pages, Wikipedia.
4) Mastering Linux Shell Scripting: A practical guide to Linux command-line, Bash scripting, and Shell programming, by MokhtarEbrahim, Andrew Mallett.

Subject Code	Subject Name	Credit Lecture (L-T-P)			Total Credits
EP101	Engineering Drawing	0	0	3	3

Unit1- Introduction to Engineering Drawing

1.1 Introduction to drawing instruments, materials, layout and sizes of drawing sheets and drawing boards.

1.2 Different types of lines in Engineering drawing as per BIS specifications

1.3 Practice of vertical, horizontal and inclined lines, geometrical figures such as triangles, rectangles, circles, ellipses and curves, hexagonal, pentagon with the help of drawing instruments.

1.4 Free hand and instrumental lettering (Alphabet and numerals) – upper case (Capital Letter), single stroke, vertical and inclined at 75 degree, series of 5,8,12 mm of free hand and instrumental lettering of height 25 to 35 mm in the ratio of 7:4

Unit2-Dimensioning Technique

2.1 Necessity of dimensioning, method and principles of dimensioning (mainly theoretical instructions)

2.2 Dimensioning of overall sizes, circles, threaded holes, chamfered surfaces, angles, tapered surfaces, holes, equally spaced on P.C.D., counter sunk holes, counter bored holes, cylindrical parts, narrow spaces and gaps, radii, curves and arches

Unit3-Scales

3.1 Scales –their needs and importance (theoretical instructions), type of scales, definition of R.F. and length of scale

3.2 Drawing of plain and diagonal scales

Unit 4-Orthographic Projections

4.1 Theory of orthographic projections (Elaborate theoretical instructions)

4.2 Projection of Points in different quadrant

4.3 Projection of Straight Line (1st and 3rd angle)

4.3.1. Line parallel to both the planes

4.3.2. Line perpendicular to any one of the reference plane

4.3.3. Line inclined to any one of the reference plane.

4.4 Projection of Plane – Different lamina like square, rectangular, triangular and circle inclined to one plane, parallel and perpendicular to another plane in 1st angle only

4.5 Three views of orthographic projection of different objects. (At least one sheet in 3 rd angle)

4.6 Identification of surfaces

Unit5- Projection of Solid

5.1. Definition and salient features of Solid

5.2. Types of Solid (Polyhedron and Solid of revolution)

5.3 To make projections, sources, Top view, Front view and Side view of various types of Solid.

Unit 6-Sections

6.1 Importance and salient features

6.2 Drawing of full section, half section, partial or broken out sections, Offset sections, revolved sections and removed sections.

6.3 Convention sectional representation of various materials, conventional breaks for shafts, pipes, rectangular, square, angle, channel, rolled sections

6.4 Orthographic sectional views of different objects.

Unit7-Isometric Views

7.1 Fundamentals of isometric projections and isometric scale.

7.2 Isometric views of combination of regular solids like cylinder, cone, cube and prism.

RECOMMENDED BOOKS:-

1. A Text Book of Engineering Drawing by Surjit Singh; DhanpatRai& Co., Delhi

2. Engineering Drawing by PS Gill; SK Kataria& Sons, New Delhi

3. Elementary Engineering Drawing in First Angle Projection by ND Bhatt; Charotar Publishing House Pvt. Ltd., Anand

4. Engineering Drawing I & II by JS Layall; Eagle Parkashan, Jalandhar

5. Engineering Drawing I by DK Goel, GBD Publication.

Subject Code	Subject Name	Credit Lecture (L-T-P)			Total Credits
EP102	Engineering Workshop Practices I	0	0	3	3

Unit 1

Fitting Shop:

Introduction and practice of various fitting processes: Use of hand tools in fitting, preparing a male and female joint of M.S.

Unit 2

Welding Shop:

Introduction and practice of various Welding processes: Electric Arc welding Practice and Gas welding, TIG, MIG, Gas Cutting and application.Joints such as a Lap joint, a T-joint or a Butt joint are to be prepared.

Unit 3

Machine Shop:

Introduction and practice of various Machining processes: Plain and Stepped cylindrical turning, grooving, knurling and Thread-cutting of a job inlathe.

TEXT BOOK(S):

   1. Elements of Workshop Technology, Vol. I and II by Hajrachoudhary, Khanna Publishers

REFERENCE(S):

   1.   Workshop Technology by WAJ Chapman, VivaBooks
   2.   Workshop Manual by Kannaiah / Narayana,Scitech

Subject Code	Subject Name	Credit Lecture (L-T-P)			Total Credits
IS102L	Physics Lab	0	0	2	2

List of Practicals:

(To be performed a minimum of 10 practicals)

1. To measure length, radius of a given cylinder, a test tube and a beaker using a Vernier caliper and find volume of each object.
2. To determine diameter of a wire, a solid ball and thickness of cardboard using a screw gauge.
3. To determine radius of curvature of a convex and a concave mirror/surface using a spherometer.
4. To verify triangle and parallelogram law of forces.
5. To find the co-efficient of friction between wood and glass using a horizontal board.
6. To determine force constant of a spring using Hook's Law.
7. To verify law of conservation of mechanical energy (PE to KE).
8. To find the moment of inertia of a flywheel.
9. To find the viscosity of a given liquid (Glycerin) by Stoke's law.
10. To find the coefficient of linear expansion of the material of a rod.
11. To determine atmospheric pressure at a place using Fortin's barometer.
12. To measure room temperature and temperature of a hot bath using mercury thermometer and convert it into different scales.

TEXT / REFERENCE BOOKS:-

1. Text Book of Physics for Class XI& XII (Part-I, Part-II); N.C.E.R.T., Delhi.
2. Comprehensive Practical Physics, Vol, I & II, JN Jaiswal, Laxmi Publications (P)Ltd.
3. Practical Physics by C. L. Arora, S. Chand Publication.
4. E-books/e-tools/ learning physics software/YouTube videos/websites etc.

Subject Code	Subject Name	Credit Lecture (L-T-P)			Total Credits
HU 101	Universal Human Values	1	1	0	5

Unit I: Motivation and Objectives of Human Values Course

Introduction to the objectives of the course.Content and process of the course including mode of conduct.Daily life as lab for the course.Activities in the course.

Unit II: Purpose of Education

How human being has a need for Knowledge, what should be the content of knowledge, how the content should be discussed in education. Complimentarily of skills and values, how the current education system falls short.

Unit III: Peers Pressure, Social Pressure

In various dimensions of life, how do these things work. What is the way out? In the context of education, peer pressure etc.

Unit IV: Concept of Competition and Excellence

How competition leads to degradation of self and relationships. How excellence is the basic need of a human being. What is excellence?

Unit V: Time Management

How does one deal with myriads of activities in college? Focus of the mind.

Unit VI: Concept of Preconditioning

How preconditioning affects our thinking, behavior, work, relationships, society and nature. How do we develop pre-conditioning? What are the various sources of preconditioning? How do we evaluate our Preconditioning? How do we come out of it?

Unit VII: Concept of Natural Acceptance in Human Being

What is natural acceptance? How can the concept of natural acceptance be used to evaluate our preconditioning. Universal nature of natural acceptance. Are anger, jealousy, hatred natural? How do we feel when we experience them? Which feelings are natural for a human being and which are not?

Unit VIII: Understanding Relationships

Are relationships important? What is the role of relationships in our life? If relationships are important then why they are important? If they are important then why it is the case that we are not discussing them? What are the notions/conditions and factors which stop us to explore more into relationships. Relationships in family and extended family.Dealing with anger, Basic expectations in relationships. Seven types of relations, Gratitude as a universal value in relationships, Nine universal values in human relationships, Trust as the founding value, Concept of acceptance, Unconditional acceptance in relationships, Our preconditioning affecting our relationships, Our relationships with subordinate staff, with people of opposite gender, caste, class, race, How relationships have the power to force a person to change his preconditioning.

Unit IX: Concept of prosperity Material goods

What role others have played in making material goods available to me: Identifying from one's own life.

Unit X: Idea of Society

What is a society? What constitutes a society? What systems are needed for a society to work? What is the purpose of society and various systems which are working in it? How understanding of Human Nature is important in order to understand the purpose of Society and various social systems? And what happens when this understanding is lacking?

Unit XI: Balance in nature

Balance which already exists in nature, How human beings are disturbing the balance. Resource depletion and pollution, our own role in wastage of electricity, water and in use of plastics, Waste management, Issues like global warming, animal extinction

SUGGESTED READINGS:

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010
2. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
3. On Education - J Krishnamurthy
4. Siddhartha - Hermann Hesse
5. Old Path White Clouds -ThichNhatHanh
6. Diaries of Anne Frank - Anne Frank
7. Life and Philosophy of Swami Vivekananda
8. Swami Vivekananda on Himself
9. Small is Beautiful - E. F Schumacher
10. Slow is Beautiful - Cecile Andrews
11. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi
12. Rediscovering India - by Dharampal
13. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
14. India Wins Freedom -Maulana Abdul Kalam Azad
15. Autobiography of a Yogi – by ParamhansaYogananda
16. Gandhi and Question of Science – Sahasrabudhe

Subject Code	Subject Name	Credit Lecture (L-T-P)			Total Credits
LM 101	Communication Skills	2	0	1	7

Chapter 1: Parts of Speech

Recognition and review of Nouns, Pronouns, Verbs, Adverbs, Adjectives, Prepositions, Conjunctions, Interjections, Knowledge of Subject, Object and Compliment of the Verb ,Verbals – Infinitival, Gerund and Preposition

Chapter 2: Prepositions of time and place

Contextual teaching of prepositions of time - on, in, at, since, for, ago, before, to, past, to, from, till/until, by Prepositions of place: in, at, on, by, next to, beside, near, between, behind, in front of, under, below, over, above, across, through, to, into, towards, onto, from

Chapter 3: Clause, phrases and Relative Clauses

Basic definitions of clauses and phrases, Focus on Relative Pronouns and their use in sentences as relative clauses

Chapter 4: Subject Verb Agreement

Rules that guide the agreement of the subject to its verb

Chapter 5: Sentence types and Transformation of sentences

Assertive sentences, Exclamatory sentences, Interrogative sentences, Negative sentences, Compound sentences, complex sentences, simple sentences, Degrees of Comparison

Chapter 6: Voice

Change from Active Voice to Passive Voice and vice versa

Chapter 7: Punctuation

 Use of the comma, semi-colon, colon, apostrophe, exclamation mark, question mark and quotation marks

Chapter 8: Word formation

Change of one part of speech to the other: from Verbs to Nouns, Nouns to Verbs, Adjectives to Nouns, Nouns to Adjectives, Verbs to adverbs, and Adverbs to Verbs

Chapter 9: Affixation

Prefixes and Suffixes and new word formations

Chapter 10: Nominal Compounds

Common nominal compound

Chapter 11: Paragraph Writing

Descriptive Paragraph on various related topics.

SUGGESTED READINGS:

1.   Essential English Grammar with Answers by Raymond Murphy (Cambridge UniversityPress)

2.   English for Polytechnics by DrPapori Rani Barooah (Eastern Book House Publishers)

3.   English Grammar by Annie Brinda (Cambridge UniversityPress)

<u>**Syllabus**</u>

<u>**Semester II**</u>

Subject Code	Subject Name	Credit Lecture (L-T-P)			Total Credits
IS104	Mathematics-II	3	1	0	11

Unit-I: Determinants and Matrices:

Elementary properties of determinants up to 3rd order; Consistency of equations; Crammer's rule; Algebra of matrices; Inverse of a matrix; Matrix inverse method to solve a system of linear equations in 3 variables.

Unit-II: Integral Calculus:

Integration as inverse operation of differentiation; Simple integration by substitution, by parts and by partial fractions (for linear factors only); Use of formula $\int_0^{\pi/2} \sin^n x\, dx, \int_0^{\pi/2} \cos^n x\, dx\ \&\ \int_0^{\pi/2} \sin^m x \cos^n x\, dx$

for solving problems where m and n are positive integers.

Unit-III: Co-ordinate Geometry:

Equation of straight line in various standard form (Without Proof); Intersection of two straight lines; Angle between two straight lines; Parallel lines and perpendicular lines; Perpendicular distance formula; Sections of a cone: Circle, Parabola, Ellipse and Hyperbola; General equation of a circle and its characteristics. ; Definition of conics (Parabola, Ellipse, Hyperbola) their standard equations (without proof). Problems

Unit-IV: Vector Algebra:

Definition, notation and rectangular resolution of a vector; Addition and subtraction of vectors; Scalar and vector products of 2 vectors; Simple problems related to work; moment and angular velocity.

Unit-V: Differential Equations:

Definition of differential equations; Order and degree of a differential equation; General and particular solution of a differential equation; Formation of differential equation whose general solution is given; Solution of first order and first degree differential equation by variable separation method; Solution of Linear differentia equations of the forms:

$(i) \dfrac{dy}{dx} + Py = Q; P\,\&\,Q\ are\ functions\,of\ x\ or\ cons\tan ts$

$(ii) \dfrac{dx}{dy} + Px = Q; P\,\&\,Q\ are\ functions\,of\ y\ or\ cons\tan ts$

. MATLAB – Simple Introductions.

TEXT BOOKS:-

3. B.S. Grewal, Higher Engineering Mathematics, Khana Publishers, New Delhi, 40th Edition,2007

4. Murray R. Spiegel, Robert E. Moyer, College Algebra, Tata McGraw Hill, New Delhi, 2nd Edition,2000

5. Frank Ayers, Elliot Mendelson, Calculus, McGraw Hill, New York, 4th Edition

REFERENCE BOOKS:-

3. G. B. Thomas, R.L. Finey, Calculus and Analytical Geometry, Addision Wesley, 9th Edition,1995

4. Murray R. Spiegel, Vector Analysis, McGraw-Hill Book Company, New York,

5. Richard Bronson, Differential Equations, Tata McGraw-Hill, New Delhi, 2nd Edition, 2004

Subject Code	Subject Name	Credit Lecture (L-T-P)			Total Credits
IS105	Physics-II	3	1	0	11

Unit - 1: Wave motion and its applications

Wave motion, transverse and longitudinal waves with examples, definitions of wave velocity, frequency and wave length and their relationship, Sound and light waves and their properties, wave equation ($y = r \sin\omega t$) amplitude, phase, phase difference, principle of superposition of waves and beat formation.

Simple Harmonic Motion (SHM): definition, expression for displacement, velocity, acceleration, time period, frequency etc. Simple harmonic progressive wave and energy transfer, study of vibration of cantilever and determination of its time period, Free, forced and resonant vibrations with examples.

Acoustics of buildings – reverberation, reverberation time, echo, noise, coefficient of absorption of sound, methods to control reverberation time and their applications, Ultrasonic waves – Introduction and properties, engineering and medical applications of ultrasonic.

Unit - 2: Optics

Basic optical laws; reflection and refraction, refractive index, Images and image formation by mirrors, lens and thin lenses, lens formula, power of lens, magnification and defects. Total internal reflection, Critical angle and conditions for total internal reflection, applications of total internal reflection in optical fiber.

Optical Instruments; simple and compound microscope, astronomical telescope in normal adjustment, magnifying power, resolving power, uses of microscope and telescope, optical projection systems.

Unit - 3: Electrostatics

Coulomb's law, unit of charge, Electric field, Electric lines of force and their properties, Electric flux, Electric potential and potential difference, Gauss law: Application of Gauss law to find electric field intensity of straight charged conductor, plane charged sheet and charged sphere.

Capacitor and its working, Types of capacitors, Capacitance and its units. Capacitance of a parallel plate capacitor, Series and parallel combination of capacitors (related numerical), dielectric and its effect on capacitance, dielectric break down.

Unit - 4: Current Electricity

Electric Current and its units, Direct and alternating current, Resistance and its units, Specific resistance, Conductance, Specific conductance, Series and parallel combination of resistances. Factors affecting resistance of a wire, carbon resistances and colour coding.

Ohm's law and its verification, Kirchhoff's laws, Wheatstone bridge and its applications (slide wire bridge only), Concept of terminal potential difference and Electro motive force (EMF)

Heating effect of current, Electric power, Electric energy and its units (related numerical problems), Advantages of Electric Energy over other forms of energy.

Unit - 5: Electromagnetism

Types of magnetic materials; dia, para and ferromagnetic with their properties, Magnetic field and its units, magnetic intensity, magnetic lines of force, magnetic flux and units, magnetization.

Concept of electromagnetic induction, Faraday's Laws, Lorentz force (force on moving charge in magnetic field). Force on current carrying conductor, force on rectangular coil placed in magnetic field.

Moving coil galvanometer; principle, construction and working, Conversion of a galvanometer into ammeter and voltmeter.

Unit - 6: Semiconductor Physics

Energy bands in solids, Types of materials (insulator, semi-conductor, conductor), intrinsic and extrinsic semiconductors, p-n junction, junction diode and V-I characteristics, types of junction diodes. Diode as rectifier – half wave and full wave rectifier (centre taped).

Transistor; description and three terminals, Types- pnp and npn, some electronic applications (list only). Photocells, Solar cells; working principle and engineering applications.

Unit - 7: Modern Physics

Lasers: Energy levels, ionization and excitation potentials; spontaneous and stimulated emission; population inversion, pumping methods, optical feedback, Types of lasers; Ruby, He-Ne and semiconductor, laser characteristics, engineering and medical applications of lasers.

Fiber Optics: Introduction to optical fibers, light propagation, acceptance angle and numerical aperture, fiber types, applications in; telecommunication, medical and sensors.

Nano-science and Nanotechnology: Introduction, nanoparticles and nano-materials, properties at nanoscale, nanotechnology, nanotechnology based devices and applications.

TEXT BOOKS:-
1. Text Book of Physics for Class XI& XII (Part-I, Part-II); N.C.E.R.T., Delhi

REFERENCE BOOKS:-
1. Applied Physics, Vol. I and Vol. II, TTTI Publications, Tata McGraw Hill, Delhi
2 Concepts in Physics by HC Verma, Vol. I & II, BhartiBhawan Ltd. New Delhi
3 Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi.
4 Modern approach to Applied Physics-I and II, AS Vasudeva, Modern Publishers.
5 A Textbook of Optics, N Subramanyam, BrijLal, MN Avahanulu, S Chand and Company Ltd.
6 Introduction to Fiber Optics, AjoyGhatak and K Thyagarajan, Cambridge University Press India

Pvt. Ltd, New Delhi.

7   Nanoscience and Nanotechnology, KK Choudhary, Narosa Publishing House, Pvt. Ltd. New Delhi.

8. Nanotechnology: Importance and Applications, M.H. Fulekar, IK International Publishing House Pvt. Ltd, New Delhi.

9. e-books/e-tools/ learning physics software/websites etc.

Subject Code	Subject Name	Credit Lecture (L-T-P)			Total Credits
IE106	Chemistry-II	3	0	0	9

Unit-1: Environmental Chemistry

Definition, types of pollution, Pollutants, Water Pollution – Causes, Effect and health hazards, Water quality parameters – D.O, B.O.D, C.O.D,T.D.S, Controlling of water pollution, Air pollution – Sources, Effect and controlling, Green house effect, Acid rain, Ozone layer depletion, photochemical smoke, Soil Pollution – Sources and controlling

Unit-2: Metallurgy

General principles of metallurgy, Explain the terms mineral, ore, gangue, slag, flux, roasting, calcinations etc., Metallurgy of Iron and Aluminum, Manufacture of steel by Bessemer, open heart and L-D process, Introduction to alloys.

Unit-3:Fuel

Definition and classification of fuel, calorific value, Gross and net calorific value, Solid fuel-Origin of coal, classification of coal by rank, pulverized coal, principle of carbonization of coal, distinguish between High temperature carbonization and low temperature carbonization, Liquid fuel-definition of Petroleum or crude oil, Classification of three varieties of crude oil, Fractional distillation of petroleum. Important properties of liquid fuel-flash point, fire point, aniline point, smoke point, knocking and octane number, cetane number, Cracking of petroleum.

Unit-4: Building Materials

Portland Cement : Composition, raw materials, Types of manufacturing, setting and hardening of cement, special cements, Glass : Definition, types, raw materials and manufacturing, Bricks : Classification and preparation

Unit-5: Lubricant

Definition of lubricant and lubrication, Classification of lubricants, Important functions of lubricants, Selection of lubricants

Unit-6: Metallic Corrosion

Definition, causes of Corrosion, Different types of Corrosion and factors affecting corrosion rate, Explanation of rusting of iron, Methods of Corrosion Control

Unit-7: Plastic and Polymer

Definition, types of polymerization, classification of polymers, Thermoplastic and Thermosetting polymers, Important Plastic materials-Monomers, properties and uses of Polythene, Polypropylene, Polystyrene, PVC, Bakelite, Teflon, neoprene, Buna-s, Nylon, Terelene.

Unit-8: Organic Chemistry

Classification and Nomenclature of Organic compounds, Homologous series and functional groups, Isomerism-structural and stereo isomerism, General preparation, properties and uses of alkanes, alkenes and alkynes, Types of organic reactions-addition, substitution, elimination and rearrangement reaction, Aromatic compounds-Benzene and its derivatives (preliminary idea only)

SUGGESTED BOOKS:

1. NCERT Text book (Class XI and XII)
2. Engg. Chem, B. K. Sharma
3. A Text Book of Engineering Chemistry, SashiChawla
4. Engineering Chemistry, Jain and Jain
5. Applied Chemistry, Dr. Raman Rani Mittal
6. Organic Chemistry, Volume I: I. L. Finer
7. Concise Inorganic Chemistry: J. D. Le

Subject Code	Subject Name	Credit Lecture (L-T-P)			Total Credits
IE 104	Fundamentals of Mechanical Engineering	2	0	0	6

Unit 1- Fundamentals of Engineering Mechanics

Fundamentals of Engineering Mechanics, Vector quantity, Scalar Quantity, Resolution of forces, Resultant of concurrent forces, parallel forces, Moment of force about a point, Couples, Centre of gravity, Centroid, C.G of simple plane figures, Moment of Inertia, Theorem of Parallel axis and Perpendicular axis, M.I of simple plane figures

Unit 2- Properties of gases:

Gas laws, Boyle's law, Charle's law, Combined gas law, Gas constant, Relation between Cp and Cv, Various non-flow processes like constant volume process, constant pressure process, Isothermal process, Adiabatic process, Poly-tropic process Properties of Steam: Steam formation, Types of Steam, Enthalpy, Specific volume, Internal energy and dryness fraction of steam, use of Steam tables, steam calorimeters. Steam Boilers: Introduction, Classification, Cochran, Lancashire and Babcock and Wilcox boiler, functioning of different mountings and accessories.

Unit 3- Thermodynamics and Heat Engines:

Energy, Work, Power, System, Heat, Temperature, Specific heat capacity, Change of state, Path, Process, Cycle, Internal energy, Enthalpy, Statements of Zeroth law, First law and Second law of thermodynamics, Classification of heat engines, Description and thermal efficiency of Carnot; Rankine; Otto cycle and Diesel cycles

Unit 4- Pumps and Compressors:

Types and operation of Reciprocating, Rotary and Centrifugal pumps, Priming Air Compressors: Types and operation of Reciprocating and Rotary air compressors, significance of Multistage. Refrigeration & Air Conditioning: Refrigerant, Vapor compression refrigeration system, vapor absorption refrigeration system, Domestic Refrigerator, Window and split air conditioners.

Unit 5- Fundamentals of I.C Engines:

Introduction, Classification of Engines, Parts of a I.C Engine, Engine details, Working of four-stroke and two-stroke cycle, Working of Petrol and Diesel engines, Indicated power, Brake Power, Efficiencies etc.

Unit 6- Couplings, Clutches and Brakes:

Construction and applications of Couplings (Box; Flange; Pin type flexible; Universal and Oldham), Clutches (Disc and Centrifugal), and Brakes (Block; Shoe; Band and Disc). Transmission of Motion and Power: Shaft and axle, Belt drive, Chain drive, Friction drive, Gear drive.

TEXT BOOKS:-

1. Basic Mechanical Engineering / Pravin Kumar/ Pearson.

2. Introduction to Engineering Materials / B.K. Agrawal/ McGraw Hill.

3. Thermodynamics and Heat Engines / R. Yadav / Central Book Depot.

4. Thermal Engineering-R.S Khurmi/JS Gupta/S.Chand.

5. Thermal Engineering-P.L.Bellaney/ Khanna publishers.

6. Elements of Environmental Science and Engineering-Meenakshi/Anjali Bagad.

7. Engineering Mechanics / R.K Bansal

8. Internal Combustion engine / V. Ganesan

REFERENCE BOOKS:-

1. Fundamental of Mechanical Engineering/ G.S. Sawhney/PHI.

2. Thermal Science and Engineering / Dr. D.S. Kumar/ Kataria.

3. Engineering Mechanics /Timoshenko.

4.Heat transfer / J. P Holman.

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Subject Code	Subject Name	Credit Lecture (L-T-P)			Total Credits
IE104	Fundamentals of Electrical & Electronics Engineering	3	1	2	13

UNIT I

Overview of Electronic Components & Signals: Passive Active Components: Resistances, Capacitors, Inductors, Diodes, Transistors, FET, MOS and CMOS and their Applications. Signals: DC/AC, voltage/current, periodic/non-periodic signals, average, rms, peak values, different types of signal waveforms, Ideal/non-ideal voltage/current sources, independent/dependent voltage current sources.

UNIT II

Overview of Analog Circuits: Operational Amplifiers-Ideal Op-Amp, Practical op amp, Open loop and closed loop configurations, Application of Op-Amp as amplifier, adder, differentiator and integrator.

UNIT III

Overview of Digital Electronics: Introduction to Boolean Algebra, Electronic Implementation of Boolean Operations, Gates-Functional Block Approach, Storage elements-Flip Flops-A Functional block approach, Counters: Ripple, Up/down and decade, Introduction to digital IC Gates (of TTL Type).

UNIT IV

Electric and Magnetic Circuits: EMF, Current, Potential Difference, Power and Energy; M.M.F, magnetic force, permeability, hysteresis loop, reluctance, leakage factor and BH curve; Electromagnetic induction, Faraday's laws of electromagnetic induction, Lenz's law; Dynamically induced emf; Statically induced emf; Equations of self and mutual inductance; Analogy between electric and magnetic circuits.

UNIT V

A.C. Circuits: Cycle, Frequency, Periodic time, Amplitude, Angular velocity, RMS value, Average value, Form Factor Peak Factor, impedance, phase angle, and power factor; Mathematical and phasor representation of alternating emf and current; Voltage and Current relationship in Star and Delta connections; A.C in resistors, inductors and capacitors; A.C in R-L series, R-C series, R-L-C series and parallel circuits; Power in A. C. Circuits, power triangle.

UNIT VI

Transformer and Machines: General construction and principle of different type of transformers; Emf equation and transformation ratio of transformers; Auto transformers; Construction and Working principle of motors; Basic equations and characteristic of motors.

RECOMMENDED BOOKS:-

1. RituSahdev, Basic Electrical Engineering, Khanna Publishing House

2. Mittle and Mittal, Basic Electrical Engineering, McGraw Education, New Delhi, 2015, ISBN :978-0-07-0088572-5

3. Saxena, S. B. Lal, Fundamentals of Electrical Engineering, Cambridge University Press, latest edition ISBN : 9781107464353

4. Theraja, B. L., Electrical Technology Vol – I, S. Chand Publications, New Delhi, 2015, ISBN: 9788121924405

5. Theraja, B. L., Electrical Technology Vol – II, S. Chand Publications, New Delhi, 2015, ISBN:9788121924375

6. Jegathesan, V., Basic Electrical and Electronics Engineering, Wiley India, New Delhi, 2015, ISBN : 97881236529513

7. Sedha, R.S., A text book of Applied Electronics, S.Chand, New Delhi, 2008, ISBN-13: 978-8121927833

8. Malvino, Albert Paul, David, Electronics Principles, McGraw Hill Education, New Delhi,2015, ISBN-13: 0070634244-978

9. Mehta, V.K., Mehta, Rohit, Principles of Electronics, S. Chand and Company, New Delhi, 2014, ISBN-13-9788121924504

10. Bell Devid, Fundamental of Electronic Devices and Circuits, Oxford University Press, New Delhi.

Subject Code	Subject Name	Credit Lecture (L-T-P)			Total Credits
IE105	Computer Programming	2	0	2	8

Unit 1- Information Storage and Retrieval

1.1 Need for information storage and retrieval

1.2 Creating data base file

1.3 Querying database file on single and multiple keys

1.4 Ordering the data on a selected key

1.5 Programming a very simple application

Unit 2- Programming in C

2.1 Basic structure of C programs

2.2 Executing a C program

2.3 Constants, variables, and data types

2.4 Operators and expressions

2.5 Managing input-output operations like reading a character, writing a character, formatted input, formatted output through print, scan, getch, putch statements etc.

2.6 Decision making and branching using IF-else, switch, go to statements

2.7 Decision making and looping using do-while, and for statements

2.8 Arrays – one dimensional and two dimensional

2.9 File

Unit 3- Computers Application Overview

3.1 Commercial and business data processing application

3.2 Engineering computation

3.3 CAD, CAM , CAE, CAI

RECOMMENDED BOOKS

1. Programming in C by Sachaum Series, McGraw Hills

2. Programming in C by Kerning Lan and Riechle Prentice Hall of India, New Delhi

3. Programming in C by BalaguruSwamy, Tata McGraw Hill, New Delhi

4. Let us C – YashwantKanetkar, BPB Publications, New Delhi

5. Vijay Mukhi Series for C and C++

6. Programming in C by R Subburaj,Vikas Publishing House Pvt Ltd.,Jangpura, New Delhi

7. Programming in C by Kris A Jansa, Galgotia Publications Pvt.Ltd.,Daryaganj, New Delhi

8. Programming in C by BP Mahapatra, Khanna Publishers, New Delhi

9. Elements of C by MH Lewin, Khanna Publishers, New Delhi

Subject Code	Subject Name	Credit Lecture (L-T-P)			Total Credits
IS106L	Chemistry Lab	0	0	2	2

LIST OF CHEMISTRY PRACTICALS:

1. Preparation of standard solution of oxalic acid or potassium permanganate.
2. Determination of strength of given sodium hydroxide solution by titrating against standard oxalicacid solution using phenolphthalein indicator.
3. Standardization of $KMnO_4$ solution using standard oxalic acid and determine the percentage ofiron present in given Hematite ore by $KMnO_4$ solution.
4. Estimation oftotal hardness of given water sample using standard EDTA solution.
5. Determination of Alkalinity of given water sample using 0.01M sulphuric acid.
6. Determination of the conductivity of given water sample.
7. Determination of pH of given water sample.
8. Determination of the total dissolved solid of a given water sample.
9. Gravimetric estimation moisture in given coal sample.
10. Determination of viscosity of a solution using Ostwald viscometer.

SUGGESTED READING:

1. A text book of quantitative Inorganic analysis: A. I. Vogel
2. Analytical Chemistry: G. D. Christian
3. Advanced Practical Physical Chemistry: J. B. Yadav
4. A textbook of Elementary Practical Chemistry (Part I and II): SudarshanBarua

Subject Code	Subject Name	Credit Lecture (L-T-P)			Total Credits
HU 102	Community Internship	1	1	0	5

Unit-1: Understanding Society

- Social structure and relationships,
- Social institutions and social groups,
- Socialization and social control : development of self

Unit-2: Community Health

- Illness and Disease, Health and public health: Meaning, components, determinants of health,
- Wellbeing and Quality of life, Health as an aspect of social development,
- Nutrition and malnutrition,
- Community Health: relevance, needs assessment, developing mechanisms for people's participation,
- Community Mental Health

Unit-3: Working with Groups

- Social Groups: Definitions, characteristics, functions and group structure,
- Principles of group work and Models of group work practice,
- Leadership - Theories of leadership, roles and responsibilities of group leader, Leadership Power, Leadership Styles, Leadership in Administration,
- Techniques and skills in group work ,Group worker: roles and functions

Unit-4: Work with Communities

- Understanding Community: Definitions, types, approaches and framework,
- Community dynamics: Caste, class, religion and gender , Issues of identity, inclusion and exclusion, Community power structure,
- Community organization- principles, steps and process,
- Community work and community participation - Strategies and principles; Models and processes,
- Professionalism and inculcation of ethics in community practice

Unit-5: Personality Development

- Definition of Personality, Determinants of Personality- biological, psychological and sociocultural factors,Communication, Flow and barriers of Communication, Listening,
- Spirituality and its role in personality development
- Stress: Causes, Management and Impact,
- Groups in organization, Interactions in group, Group Decision Taking, Team Building

Unit-6: Development Communication

- Communication: concept, principles and its significance
- Process of Communication, Forms of communication: Verbal, non-verbal and written.

- Self-awareness in communication
- Barriers to communication

SUGGESTED READINGS:

1. Davis, K. 1969. *Human Society*, New York: The Macmillan.
2. Giddens, A.1999. *Sociology*, Cambridge: The Polity Press.
3. Dasgupta, M. & Lincoln, C.C. 1996, *Health, Poverty and Development in India*. New Delhi: Oxford University Press.
4. Trecker, H.B. 1972, *Social Group Work: Principles and Practices*. New York: Association Press.
5. Weil, M. (ed,) 1996, *Community Practice: Conceptual Models*. New York: The Haworth Press Inc.
6. Hergenhahn, B. R., &Olson., M. H. 2003, *An Introduction to Theories of Personality*, New Jersey: Prentice Hall.

Subject Code	Subject Name	Credit Lecture (L-T-P)			Total Credits
DC 201	Electronic Circuits	3	1	0	11

Unit I

RC Circuits: Response of high pass and low pass RC circuits to sine, step, pulse and square wave inputs, Differentiator, Integrator.

BJT biasing circuits: Types, Q point, Bias stability, Stability factors, RC coupled amplifier and effect of various components, Concept of DC and AC load lines, Fixing of operating point, Classification of amplifiers

Unit II

Small signal analysis of CE, CB and CC configurations using small signal hybrid π model (gain, input and output impedance). Small signal analysis of BJT amplifier circuits, Cascade amplifier.

Unit III

High frequency equivalent circuits of BJT, Short circuit current gain, cutoff frequency, Miller effect, Analysis of high frequency response of CE, CB and CC amplifiers.Wide band amplifier: Broad banding techniques, low frequency and high frequency compensation, Cascode amplifier.

Unit IV

Feedback amplifiers: Effect of positive and negative feedback on gain, frequency response and distortion, Feedback topologies and its effect on input and output impedance, Feedback amplifier circuits in each feedback topologies (no analysis required) Oscillators & Tuned Amplifiers: Classification of oscillators, Barkhausen criterion, Analysis of RC phase shift and Wien bridge oscillators, Working of Hartley, Colpitts and Crystal oscillators; Tuned amplifiers, synchronous and stagger tuning.

Unit V

Power amplifiers: Classification, Transformer coupled class A power amplifier, push pull class B and class AB power amplifiers, efficiency and distortion, Transformer-less class B and Class AB power amplifiers, Class C power amplifier (no analysis required)

Switching Circuits: Simple sweep circuit, Bootstrap sweep circuit, Astable, Bistable, and Monostable multivibrators, Schmitt Trigger.

Unit VI

Transistor based voltage regulator: Design and analysis of shunt and series voltage regulator, load and line regulation, Short circuit protection.

MOSFET amplifiers: Biasing of MOSFET amplifier, DC analysis of single stage MOSFET amplifier, small signal equivalent circuit. Small signal voltage and current gain, input and output impedances of CS configuration, MOSFET Cascade amplifier.

Plate Tectonics: Introduction, Plate boundaries- transform, divergent, convergent; current plates of the earth.

TEXT BOOKS:

1. Sedra A. S. and K. C. Smith, Microelectronic Circuits, 6/e, Oxford University Press, 2013

2. Millman J. and C. Halkias, Integrated Electronics, 2/e, McGraw-Hill, 2010

REFERENCES:

1. Neamen D., Electronic Circuits - Analysis and Design, 3/e, TMH, 2007

2. Rashid M. H., Microelectronic Circuits - Analysis and Design, Cengage Learning, 2/e, 2011

3. Spencer R. R. and M. S. Ghausi, Introduction to Electronic Circuit Design, Pearson, 2003

4. Razavi B., Fundamentals of Microelectronics, Wiley, 2015

Subject Code	Subject Name	Credit Lecture (L-T-P)			Total Credits
		3	1	2	
DC 202	Analog Electronics	3	1	2	13

Unit 1-Semi conductor physics:

Review of basic atomic structure and energy levels, concept of insulators, conductors and semi conductors, atomic structure of Ge and Si, covalent bonds Concept of intrinsic and extrinsic semi conductor, P and N impurities, doping of impurity. P and N type of semiconductors and their conductivity. Effect of temperature on conductivity of intrinsic semi conductor.Energy level diagram of conductors, insulators and semi conductors; minority and majority carriers.

Unit 2-Semi conductor diode:

PN junction diode, mechanism of current flow in PN junction, Drift and diffusion current, depletion layer, forward and reverse biased PN junction, potential n=barrier, concept of junction capacitance in forward and reverse bias condition.

V-I characteristics, static and dynamic resistance and their calculation from diode characteristics.Diode as half wave, full wave and bridge rectifier. PIV, rectification efficiencies and ripple factor calculations, shunt capacitor filter, series inductor filter, LC filter and filter. Types of diodes, characteristics and applications of zenor diodes.Zenor and avalanche breakdown.

Unit 3-Introduction to Bipolar transistor:

Concept of bipolar transistor, structure, PNP and NPN transistor, their symbols and mechanism of current flow; Current relations in transistor; concept of leakage current; CB, CE, CC configuration of the transistor; Input and output characteristics in CB and CE configurations; input and output dynamic resistance in CB and CE configurations; Current amplification factors. Comparison of CB CE and CC Configurations; Transistors as an amplifier in CE Configurations; d.c. load line and calculation of current gain, voltage gain using d.c load line.

Unit 4-Transistor biasing circuits:

Concept of transistor biasing and selection of operating point. Need for stabilization of operating point. Different types of biasing circuits.

Unit 5-Single stage transistor amplifier:

Single stage transistor amplifier circuit, a.c load line and its use in calculation of currents and voltage gain of a single stage amplifier circuit. Explanation of phasereversal of output voltage with respect to input voltage. H- parameters and their significance. Calculation of current gain, voltage gain, input impedance and output impedance using h-parameter.

Unit 6-Field effect Transistors

Construction, operation and characteristics of FET and its application.

- Construction, operation and characteristics of MOSFET in depletion and enhancement modes and its applications.

- C MOS – advantages and applications

- Comparison of JFET, MOSFET and BJT.

- FET amplifier circuit and its working principle. (No analysis)

RECOMMENDED BOOKS:-

1. Basic Electronics and linear Circuit by NN Bhargava and Kulshreshta, Tata McGraw Hill, New Delhi.

2. Principles of Electrical and Electronics Engineering by VK Mehta; S Chand and Co., New Delhi

3. Electronic Components and Materials by SM Dhir, Tata McGraw Hil, New Delhi.

4. Electronic Devices and Circuits by Millman and Halkias; McGraw Hill.

5. Principles of Electronics by Albert Paul Malvino; Tata McGraw Hill, New Delhi

6. Electronics Devices and Circuits-I by Naresh Gupta, JyoteshMalhotra and harish C Saini, Eagle Prakashan, Jalandhar

7. Electronics Devices and Circuits by Rama Reddy, Narosa Publishing House Pvt. Ltd., New Delhi.

Subject Code	Subject Name	Credit Lecture (L-T-P)			Total Credits
DC 203	Transducer & Application	3	0	2/2	10

Unit 1- Basic concepts

- Definition and classification of transducers

Unit 2- Variable Resistance Transducers Construction, working principle, selection criteria and application of

- Potentiometer, strain gauge, load cell

- Hot wire anemometer, photo resistors

- Resistire temperature transducers

- Themistors

- Carbon Microphones

- Aceelometer advantages, disadvantage and limitation

Unit 3- Variable Inductance transducer

- Construction, working principles, selection criteria and application of

- Electromagnetic pick up

- Induction potentiometer

- Linear variable differential transformer

- Synchronous transmitter and receivers, advantages, disadvantages and limitations

Unit 4- Variable capacitance Transducers

- Construction, basis principle selection criteria and application of

- Capacitance pick up

- Condenser microprocessor

- Differential capacitor pick up advantages, disadvantages and limitations

Unit 5- Piezoelectric Transducers

- Construction basic principle, selection criteria and application of

- Piezoelectric Transducer

- Selsmic pick up

- Ultrasonic, Transducer

- Advantage, disadvantages and limitations

Unit 6- Other types of transducers

- Transducers based upon hall effect

- Optical transducers-photo diode, photo transistor LDR, and LED

- Digital transducer-single shaft encoder

- Techno generator

- Advantage and disadvantage and limitations

LIST OF PRACTICALS

1. Study of strain gauge and measurement of strain for a given sample

2. Study of piezoelectric pressure transducer

3. Study of RTD (Resistance Temperature detector)

4. Study of thermistors

5. Study of calibration of LVDT

6. Study of capactive transducer and measurement of angular displacement

7. Study of magnetic pick up

8. Study of draw the characteristics of a capacitance transducer

9. Study of Thermocouple

10. To study and draw the characteristics of following

- LDR

- Photo diode

- Photo transistor

RECOMMENDED BOOKS:-

1. Electrical and Electronics Measurement and Instrumentation by A.K. Shawney, DhanpatRai and Co., New Delhi

2. Mechanical and industrial measurement by R.K.Jain, Khanna Publishers, New Delhi

3. Transducers by Peter Norton

4. Mechatronics by Bolton, Prentice Hall of India, New Delhi

Subject Code	Subject Name	Credit Lecture (L-T-P)			Total Credits
DC 204	Principles of Instrumentation	3	0	0	9

Unit 1- Basic building blocks of any instrumentation systems

- Scope and necessity of instrumentation

- Name of important process variables, their units

- Building blocks of instrumentation system

- Various testing signals

Unit 2- Performance characteristics of Instruments

- Static and dynamic characteristics of instruments

- Concept of time constant, response time, natural frequency, damping co-efficient

- Order of instruments (1st and 2nd order) with industrial applications

- Ramp, sinusoidal, step response of different orders of instruments systems

- Analytical execution

Unit 3- Display and recording devices

- Operating mechanism in indicators and recording devices

- Various indicating. Integrating and recording methods and their combination

- Merits and demerits of circular chart and strip chart recorder

- Basics of printing devices

- Scanning, data logging and field buses

- Bar graph LCD, seven segment display, X-Y recorder, scanners

- Design experiments for display system

Unit 4- Instrument selection

- Factors affecting instrument selection, accuracy, precision,

linearity, resolution, sensitivity, hysteresis, reliability, serviceability, loading effect, range advantage and limitation, cost effectiveness and availability

- Static and dynamic response

- Environmental effects

- Calibration tools

Unit 5- Errors

- Sources and classification of errors, the remedial action

- Grounding earthing, guarding and shielding

- Precautions

- Analytical execution

RECOMMENDED BOOKS:-

1. Mechanical and Industrial Measurement of by RK Jain, Khanna Publishers, New Delhi
2. Industrial Instrumentation by Donald P Eickrman
3. Electrical and Electronics Measurement of by AK Shawney, DhanpatRai and Company, New Delhi
4. Advanced Instrumentation and Control by MF Kureshi

Subject Code	Subject Name	Credit Lecture (L-T-P)			Total Credits
DC 205	Principles of Digital Electronics	2	1	0	8

Unit 1- Introduction

a) Define digital and analog signals and systems, difference between analog and digital signals

b) Need of digitization and applications of digital systems.

Unit 2- Number Systems

a) Decimal, binary, octal, hexadecimal number systems

b) Conversion of number from one number system to another including decimal points

c) Binary addition, subtraction, multiplication, division, 1st and 2nd complement method of subtraction

d) BCD code numbers and their limitations, addition of BCD coded numbers, conversion of BCD to decimal and vice-versa

e) Excess-3 code, gray code, binary to gray and gray to binary conversion

f) Concept of parity, single and double parity, error detection and correction using parity

Unit 3- Logic Gates

a) Logic gates, positive and negative logic, pulse waveform, definition, symbols, truth tables, pulsed operation of NOT, OR,AND, NAND, NOR, EX-OR, EX-NOR gates

Unit 4- Logic Simplification

a) Rules and laws of Boolean algebra, logic expression, Demorgan's theorems, their proof

b) Sum of products form (minterm), Product of sum form (maxterms), simplification of Boolean expressions with the help of Rules and laws of Boolean algebra

c) Karnaugh mapping techniques upto 4 variables and their applications for simplification of Boolean expression

Unit 5- Arithmetic Circuits

a) Half adder, full adder circuits and their operation

b) Parallel binary adder, 2-bit and 4-bit binary full adder, block diagram, working

RECOMMENDED BOOKS:-

1. Digital Electronics and Applications by Malvino leach, Tata McGral Hill, New Delhi

2. Digital Logic Designs by Morris Mano, Prentice Hall of India, New Delhi

3. Digital Fundamentals by Thomas Floyds, Universal Book Stall

4. Digital Electronics by RP Jain, Tata McGraw Hill, New Delhi

5. Digital Electronics by KS Jamwal, DhanpatRai& Co., New Delhi

6. Digital Electronics by Rajiv Sapra, Ishan Publication, Ambala

7. Digital Electronics by BR Gupta, DhanpatRai& Co., New Delhi

8. Digital Systems: Principles and Applications by RJ Tocci, Prentice Hall of India, New Delhi

9. Digital Electronics by Rajaraman V., Prentice Hall of India, New Delhi

Subject Code	Subject Name	Credit Lecture (L-T-P)			Total Credits
IS 201	Numerical Methods	2	1	0	8

UNIT I-SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS

Solution of algebraic and transcendental equations – Fixed point iteration method – Newton Raphson method – Solution of linear system of equations – Gaus elimination method – Pivoting – Gaus Jordan method – Iterative methods of Gaus Jacobi and Gaus Seidel – Eigenvalues of a matrix by Power method and Jacobi's method for symmetric matrices.

UNIT II- INTERPOLATION AND APPROXIMATION

Interpolation with unequal intervals – Lagrange's interpolation – Newton's divided diference interpolation – Cubic Splines – Diference operators and relations – Interpolation with equal intervals – Newton's forward and backward diference formulae.

UNIT III- NUMERICAL DIFFERENTIATION AND INTEGRATION

Aproximation of derivatives using interpolation polynomials – Numerical integration using Trapezoidal, Simpson's 1/3 rule – Romberg's Method – Two point and thre point Gausian quadrature formulae – Evaluation of double integrals by Trapezoidal and Simpson's 1/3 rules.

UNIT IV- INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS

Single step methods – Taylor's series method – Euler's method – Modifed Euler's method – Fourth order Runge – Kuta method for solving first order equations – Multi step methods – Milne's and Adams – Bash forth predictor corector methods for solving first order equations.

UNIT V- BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS

Finite diference methods for solving second order two – point linear boundary value problems – Finite diference techniques for the solution of two dimensional Laplace's and Poison's equations on rectangular domain – One dimensional heat flow equation by explicit and implicit (Crank Nicholson)methods – One dimensional wave equation by explicit method.

TEXT BOOKS:

1) B.S. Grewal, "Numerical Methods in Engineering & Science", Khanna Publication, Ed. 9th.
2) E. Balagurusamy , "Numerical Method", Tata McGraw Hill Publication.· S.S. Sastry, "Introductory Methods of Numerical Analysis", PHI learning Pvt. Ltd.

REFERENCES:

1) Curtis F. Gerald and Patrick O. Wheatley, "Applied Numerical Analysis", Pearson Education.
2) M.K Jain, S. R. K. Iyengar and R.K Jain, "Numerical Methods for Scientific and Engineering computation", New age International Publishers.

Subject Code	Subject Name	Credit Lecture (L-T-P)			Total Credits
DC 206	Linear Integrated Circuits	3	0	0	11

UNIT I-BASICS OF OPERATIONAL AMPLIFIERS

Current mirror and current sources, Current sources as active loads, Voltage sources, Voltage References, BJT Differential amplifier with active loads, Basic information about op-amps – Ideal Operational Amplifier – General operational amplifier stages -and internal circuit diagrams of IC 741, DC and AC performance characteristics, slew rate, Open and closed loop configurations – JFET Operational Amplifiers – LF155 and TL082.

UNIT II- APPLICATIONS OF OPERATIONAL AMPLIFIERS

Sign Changer, Scale Changer, Phase Shift Circuits, Voltage Follower, V-to-I and I-to-V converters, adder, subtractor, Instrumentation amplifier, Integrator, Differentiator, Logarithmic amplifier, Antilogarithmic amplifier, Comparators, Schmitt trigger, Precision rectifier, peak detector, clipper and clamper, Low-pass, high-pass and band-pass Butterworth filters.

UNIT III- ANALOG MULTIPLIER AND PLL

Analog Multiplier using Emitter Coupled Transistor Pair – Gilbert Multiplier cell – Variable transconductance technique, analog multiplier ICs and their applications, Operation of the basi PLL, Closed loop analysis, Voltage controlled oscillator, Monolithic PLL IC 565, application of PL for AM detection, FM detection, FSK modulation and demodulation and Frequency synthesizing and clock synchronisation.

UNIT IV- ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERTERS

Analog and Digital Data Conversions, D/A converter – specifications – weighted resistor type, R-2 Ladder type, Voltage Mode and Current-Mode R – 2R Ladder types – switches for D/A converters high speed sample-and-hold circuits, A/D Converters – specifications – Flash type – Successive Approximation type – Single Slope type – Dual Slope type – A/D Converter using Voltage-to-Time Conversion – Over-sampling A/D Converters, Sigma – Delta converters.

UNIT V- WAVEFORM GENERATORS AND SPECIAL FUNCTION ICS

Sine-wave generators, Multivibrators and Triangular wave generator, Saw-tooth wave generator,ICL8038 function generator, Timer IC 555, IC Voltage regulators – Three terminal fixed and adjustable voltage regulators – IC 723 general purpose regulator – Monolithic switching regulator, Low Drop – Out(LDO) Regulators – Switched capacitor filter IC MF10, Frequency to Voltage andVoltage to Frequency converters, Audio Power amplifier, Video Amplifier, Isolation Amplifier, Optocouplers and fibre optic IC..

TEXT BOOKS:

1) Sergio Franco, 'Design with operational amplifiers and analog integrated circuits', McGraw-Hill, 1997.

2) D.Roy Choudhry, Shail Jain, "Linear Integrated Circuits", New Age International Pvt. Ltd., 2000.

REFERENCES:

1) Gray and Meyer, 'Analysis and Design of Analog Integrated Circuits', Wiley International, 1995.

2) J.Michael Jacob, 'Applications and Design with Analog Integrated Circuits', Prentice Hall of India, 1996.

3) Ramakant A.Gayakwad, 'OP-AMP and Linear IC's', Prentice Hall / Pearson Education, 1994.

4)K.R.Botkar, 'Integrated Circuits'. Khanna Publishers, 1996.

5)Taub and Schilling, Digital Integrated Electronics, McGraw-Hill, 1997.

6)Millman.J. and Halkias.C.C. 'Integrated Electronics', McGraw-Hill, 1972.

7) William D.Stanely, 'Operational Amplifiers with Linear Integrated Circuits'. Pearson Education, 2004.

Code	Subject Name	Credit Lecture (L-T-P)			Total Credits
DC 207	Digital Electronics	3	0	2/2	10

Unit 1-Multiplexer/Demultiplexer

a) Basic functions, symbols and logic diagrams of 4-inputs and 8-inputs multiplexers.

b) Function/utility of 16 and 32 inputs multiplexers.

c) Realization of Boolean expression using multiplexer/demultiplexers

Unit 2-Decoders, Display Devices and Associated Circuits

a) Basic Binary decoder, 4-line to 16 line decoder circuit

b) BCD to decimal decoder, BCD to 7-segment decoder/driver, LED/LCD display

Unit 3-Encoders and Comparators

a) Encoder, decimal to BCD encoder, decimal to BCD priority encoder, keyboard encoder

b) Magnitude comparators, symbols and logic diagrams of 2-bit and 4-bit comparators

Unit 4-Latches and Flip-Flops

a) Letch, Sr-latch, D-latch, Flip-flop, difference between latch and flip-flop

b) S-R, D flip-flop their operation using waveform and truth tables, race aroung condition

c) JK flip-flop, master slave and their operation using waveform and truth tables

Unit 5-Counters

a) Asynchronous counter, 4-bit Asynchronous counter, Asynchronous decade counter

b) Asynchronous counter, 4-bit Synchronous binary counter, Asynchronous

c) Up/down Asynchronous counters, divide by N counter MOD-3, MOD-5, MOD-7, MOD-12 counters

d) Ring counter, cascaded counter, counter applications

Unit 6-Shift Registers

a) Shift registers functions, serial-in-serial out, serial-in-parallel-out, parallel-in serial-out, parallel-in-parallel out

b) Universal shift register, shift register counter and applications of shift registers

RECOMMENDED BOOKS:-

1. Digital Electronics and Applications by Malvino leach, Tata McGral Hill, New Delhi

2. Digital Logic Designs by Morris Mano, Prentice Hall of India, New Delhi

3. Digital Fundamentals by Thomas Floyds, Universal Book Stall

4. Digital Electronics by RP Jain, Tata McGraw Hill, New Delhi

5. Digital Electronics by KS Jamwal, DhanpatRai& Co., New Delhi

6. Digital Electronics by Rajiv Sapra, Ishan Publication, Ambala

7. Digital Electronics by BR Gupta, DhanpatRai& Co., New Delhi

8. Digital Systems: Principles and Applications by RJ Tocci, Prentice Hall of India, New Delhi

9. Digital Electronics by Rajaraman V., Prentice Hall of India, New Delhi

Subject Code	Subject Name	Credit Lecture (L-T-P)			Total Credits
DC 208	Basics of Control System	3	0	0	9

Unit 1- Introduction

Basic elements of control system, open loop control system, closed loop control system, manually controlled closed loop systems, automatic controlled closed loop systems, control system examples from mechanical systems, electrical systems, introduction to laplace

transform

Unit 2- Control system representation

Transfer function, block diagram, reduction of block diagram, Mason's formula signal flow graph

Unit 3- Time Response Analysis

Standard test signals, time response of first and second-order system, time constant, time response of second other system, time response specifications, steady-state errors and error constants.

Unit 4- Stability

Routh Hurwitz Criterion, Root Locus, Bode Plotting

Unit 5- Multiloop Control System

Introduction to feed forward, cascade, ratio, split range, control system.

Unit 6- Non-Linear Control System

Introduction, behaviour of non-linear control system, Different types of nonlinear ties, saturation, backlash, hystersis, dead zone, relay, friction, characteristics of non-linear control system, jump resonance, jump phenomenon. Difference between linear and non-linear control system.

LIST OF PRACTICALS

1. Study of characteristic of servomotor

2. Characteristics and speed control of a stepper motor

3. Study of non-linearity in a relay

4. Study of dead-zone non-linearity

5. To study cascade control system

6. To study ratio control system

7. To study feedforward control system

8. To study split-range control system

9. Study of ON-OFF controller

RECOMMENDED BOOKS:-

1. Control Systems by Nagrath and Gopal

2. Control Systems by KUO

3. Control Systems by Ogata

4. Chemical Process Control by Stephenapolis

5. Control Systems by RC Shukla

Subject Code	Subject Name	Credit Lecture (L-T-P)			Total Credits
DC 209	Electronic Instruments and Measurements	3	0	2	11

Unit 1- Basics of Measurements

Measurement, method of measurement, types of instruments Specifications of Instruments; Accuracy, precision, sensitivity, resolution, range, Errors in measurement, sources of errors, limiting errors loading effect, Requirements, importance and applications of standards, calibration

Unit 2- Multimeter

principles of measurement of DC voltage, DC current , AC voltage , AC current , moving coil and moving iron type instruments (voltmeter and ammeter), Block diagram of multimeter and measurement of voltage , current and resistance Using multimeter. Specifications of multimeter and their applications. Limitations with regard to frequency and input impedance.

Unit 3- Electronic voltmeter

Advantages over conventional multimeter for volt measurement with respect to input impendence and sensitivity. Principles of voltage , current and resistance measurement (block diagram only) Specifications of electronics voltmeter.

Unit 4- A C Milli voltmeter

Types of AC milli voltmeters and their block diagram description. Typical specification and their significance

Unit 5- Cathode Ray Oscilloscope

Construction and working of different blocks used in CRT.Time base operation and need for banking during flyback, synchronization.Block diagram description of a basic CRO and triggered sweep oscilloscope,front panel controls specifications of CRO and their explanation. Measurement of current, voltage , frequency , time period and phase using CRO.CRO probes ,special features of dual beam ,dual trace , delay sweep.Digital storage oscilloscope :block diagram and working principal

Unit 6- Singal Generators and Analysis Instruments

Explanation of block diagram specifications of low frequency and RF generators,Pulse generator , function generator.Distortion factor meter; wave analyzer and spectrum analyser

Unit 7-Impedance Bridges and Q Meters

Wheat stone bridge.AC bridges: Maxwell's induction bridge, Hay's bridge, De-Sauty's bridge Schering bridge and Anderson bridge. Block diagram description of laboratory type RLC bridge, specifications of RLC Bridge Block diagram and working principle of Q meter.

Unit 8-Digital Instruments

Comparison of analog and digital instruments.Working principle of ramp, dual slope and integration type digital voltmeter.Block diagram of time interval, time period and frequency using

universal.Counter/frequency counter Working principle of logic probe, logic pulser, logic analyzer, logic comparator,Signature analyzer and logic analyser.

RECOMMENDED BOOKS:-

1. Electronics Measurement and Instrumentation by AK Sawhney, DhanpatRai& Sons, Delhi

2. Electronics Instrumentation by Cooper, Prentice Hall of India

3. Electronics Test and Instrumentation by Rajiv Sapra, Ishan Publications, Ambala

4. Electronics Instrumentation by JB Gupta, SatyaPrakashan, New Delhi

Subject Code	Subject Name	Credit Lecture (L-T-P)			Total Credits
DC 210	Principles of Communication Engineering	3	1	0	11

UNIT I

Introduction: Overview of Communication system, Communication channels, Need for modulation, Baseband and Pass band signals, Amplitude Modulation: Double sideband with Carrier (DSB-C), Double side band without Carrier DSB-SC, Single Side Band Modulation SSB, Modulators and Demodulators, Vestigial Side Band (VSB), Quadrature Amplitude Modulator, Radio Transmitter and Receiver.

UNIT II

Angle Modulation, Tone Modulated FM Signal, Arbitrary Modulated FM Signal, Bandwidth of FM Signals using Bessel's Function, FM Modulators and Demodulators, Approximately Compatible SSB Systems, Stereophonic FM Broadcasting.

UNIT III

Pulse Modulation, Digital Transmission of Analog Signals: Sampling Theorem and its applications, Pulse Amplitude Modulation (PAM), Pulse Width Modulation, Pulse Position Modulation, Their generation and Demodulation, Digital Representation of Analog Signals Pulse Code Modulation (PCM), PCM System Issues in digital transmission: Frequency Division Multiplexing Time Division Multiplexing, T1 Digital System, TDM Hierarchy

UNIT IV

Differential Pulse Code Modulation, Delta Modulation. Adaptive Delta Modulation, Voice Coders, Sources of Noises, Frequency domain representation of Noise, Super position of Noises, Linear filtering of Noises, Mathematical Representation of Noise.

UNIT V

Noise in Amplitude Modulation: Analysis, Signal to Noise Ratio, Figure of Merit. Noise in Frequency Modulation: Pre-emphasis, De-Emphasis and SNR Improvement, Phase Locked Loops Analog and Digital.

TEXT BOOKS:

1. Herbert Taub and Donald L. Schilling, "Principles of Communication Systems", Tata McGraw Hill.
2. Rishabh Anand, Communication Systems, Khanna Publishing House, Delhi

REFERENCE BOOKS:

1. B.P.Lathi,"ModernDigitalandAnalogcommunicationSystems",3rd Edition, Oxford University Press.
2.Simon Haykin, "Communication Systems", 4th Edition, Wiley India.
3. H.P.Hsu& D. Mitra "Analog and Digital Communications", 2nd Edition, Tata McGraw-Hill.

Syllabus

Semester V

Subject Code	Subject Name	Credit Lecture (L-T-P)			Total Credits
DC301	Microprocessors & Applications	3	0	2/2	10

Unit 1- Introduction to microprocessor

- Architecture of 8085

- Pin Diagram of 8085

- Timing Diagram

- Instruction set of 8085

- Interrupts

- Programming of 8085

- Interfacing and I/O ports

- PPI e.g. 8255 A

- Programming of 8255A

- 8155 in detail

- 8257 in detail

- Serial I/O data communication

- Introduction to 16-bit microprocessor

- Introduction to microcomputers

- Introduction to 8086

- Block Diagram of 8086

- Microprocessors based development system

Unit 2- Microprocessor applications

- Industrial application of 8257

Unit 3-Programming exercises can be performed with available kits

LIST OF RECOMMENDED BOOKS

1. Microprocessor Architecture, Programming and Applications with 8085 by RS Gaonkar

2. Microprocessor and Applications by B Ram

3. Comprehensive Study of Microprocessor by Naresh Grover

4. Introduction to Microprocessor by Adithya P Mathur, Tata McGraw Hill Publishers, New Delhi

5. Microprocessor by SK Goel

6. 8051 by Mcakenzie, Prentice Hall of India, New Delhi.

Subject Code	Subject Name	Credit Lecture (L-T-P)			Total Credits
DC302	Power Electronics	3	0	2/2	10

Unit 1- Introduction to Thyristors and other power electronics devices

a) Construction, Working principles of SCR, two transistor analogy of SCR, VI characteristics of SCR.

b) SCR specifications & ratings.

c) Different methods of SCR triggering.

d) Different commutation circuit for SCR.

e) Series & parallel operation of SCR.

f) Construction & working principle of DIAC, TRIAC & their V-I characteristics.

g) Construction, working principle of UJT, VI characteristics of UJT. UJT as relaxation oscillator.

h) Brief introduction to Gate Turn off thyristor (GTO),

Programmable uni-junction transistor (PUT), MOSFET, IGBT.

i) Basic idea about the selection of Heat sink for thyristors.

j) Application such as light intensity control, speed control of universal motors, fan regulator, battery charger.

Unit 2- Controlled Rectifiers

a) Single phase half wave controlled rectifier with load (R, R-L)

b) Single Phase half controlled full wave rectifier (R,R-L)

c) Fully controlled full wave bridge rectifier.

d) Single phase full wave centre lap rectifier.

Unit 3- Inverters, Choppers, Dual Converters and Cyclo converters.

i) Principle of operation of basic inverter circuits, concepts of duty cycle, series & parallel, Inverters & their application.

ii) Choppers: Introduction, types of choppers (Class A, Class B, Class C, and Class D). Step up and step down choppers.

iii) Dual Converters &cyclo converters: Introduction, types & basic working principle of dual converters &cyclo converters & their application.

Unit 4- Thyristorised Control of Electric drives

a) DC drive control

i) Half wave drives.

ii) Full wave drives.

iii) Chopper drives (Speed control of DC motor using choppers)

b) AC drive control

i) Phase control (Speed control of induction motor using variable frequency)

ii) Constant V/F operation

iii) Cycloconverter/Inverter drives.

iv) Slip power control of AC drives.

Unit 5- Uninterrupted Power supplies

i) UPS, on-line, off line & its specifications

ii) Concept of high voltage DC transmission

RECOMMENDED BOOKS:-

1. Power Electronics by P.C. Sen Tata McGraw Hill. New Delhi

2. Power Electronics by P.S. Bhimbhrah, Khanna Publishers, New Delhi

3. Power Electronics by M.S. Berde, Khanna Publishers, New Delhi

4. Power Electronics by MH Rashid

5. Industrial Electronics and Control by SK Bhattacharya and S. Chatterji, New Age Publications. New Delhi

6. Power Electronics by S Rama Reddy, Narosa Publishing House Pvt.Ltd., New Delhi

7. Power Electronics by Sugandhi and Sugandhi

8. Power Electronics – Principles and Applications by J Michael Jacob, Vikas Publishing House, New Delhi

Subject Code	Subject Name	Credit Lecture (L-T-P)			Total Credits
DC303	Industrial Process control & Instrumentation	3	0	0	9

Unit 1- Introduction

Trends in process control, selection of key variables for process

control, hydraulic, pneumatic and electronic instrumentation

Unit 2- Flow Measurement

Construction, working principle, selection criteria and

application of flow measurement with orifices, magnetic, ultrasonic, vortex flow meters, turbine flow

meter and rotameter.

Unit 3- Level Measurement

Construction, working principle, selection criteria and

application of level detectors, float level devices, level gauges, optical level devices, radiation level

sensors, thermal level sensors, level switch.

Unit 4- Temp. Measurement

Construction, working principle, selection criteria and

application of temp sensors – thermocouples, RTD's thermisters, radiation pyrometry, IR detectors

Unit 5- Pressure Measurement

Construction, working principle, selection criteria and

application of pressure sensors – bellows, tiaphragon, bourdon and helical types,

electronic pressure sensor, manometers, pressure gauges, vaccum sensors, high pressure sensors, pressure

switch

Unit 6- Measurement System

Measure system for Density, pH, humidity, moisture and viscosity measurement

RECOMMENDED BOOKS:-

1. Mechanical measurements by AK Sawhney; DhanpatRai and Co. New Delhi

2. Process control instrumentation technology by Custis D Johnson: Joh Wiley and sons

3. Process/Industrial Instruments and Control Handbook by considine: Douples M: Magraw Hill

4. Mechanical Measurement by Becwith and Buch: pearson

5. Mechanical and Industrial Msrunts by RK Jain, Khanna Publisher, New Delhi

Subject Code	Subject Name	Credit Lecture (L-T-P)			Total Credits
DC304	Optical Fiber Engineering	2	0	0	6

UNIT I INTRODUCTION TO OPTICAL FIBERS

Introduction-general optical fiber communication system- basic optical laws and definitions. Optical modes and configurations -mode analysis for optical propagation through fibers. Modes in planar wave guide-modes in cylindrical optical fiber-transverse electric and transverse magnetic modes- fiber materials-fiber fabrication techniques-fiber optic cables. Classification of optical fiber-single mode fiber-graded index fiber.

UNIT II TRANSMISSION CHARACTERISTIC OF OPTICAL FIBER

Attenuation-absorption –scattering losses-bending losses-core and cladding losses-signal dispersion –inter symbol interference and bandwidth-intra model dispersion-material dispersion- waveguide dispersion-polarization mode dispersion-intermodal dispersion. Dispersion optimization of single mode fiber-characteristics of single mode fiber-R-I Profile. Cutoff wave length-dispersion calculation-mode field diameter

UNIT III OPTICAL SOURCES AND DETECTORS

Sources: Intrinsic and extrinsic material-direct and indirect band gaps-LED-LED structures. Surface emitting LED-Edge emitting LED-quantum efficiency and LED power-light source materials-modulation of LED-LASER diodes-modes and threshold conditions-Rate equations-external quantum efficiency-resonant frequencies-structures and radiation patterns-single mode laser-external modulation-temperature effort.Detectors: PIN photo detector-Avalanche photo diodes-Photo detector noise-noise sources-SNR-detector response time-Avalanche multiplication noise-temperature effects. Comparisons of photo detectors.

UNIT IV OPTICAL RECEIVER, MEASUREMENTS AND COUPLING

Fundamental receiver operation-preamplifiers-digital signal transmission-error sources-Front end amplifiers-digital receiver performance-probability of error-receiver sensitivity-quantum limit.Optical power measurement-attenuation measurement-dispersion measurement- Fiber Numerical Aperture Measurements- Fiber cut- off Wave length Measurements- Fiber diameter measurements-Source to Fiber Power Launching-Lensing Schemes for Coupling Management-Fiber to Fiber Joints-LED Coupling to Single Mode Fibers-Fiber Splicing. Optical Fiber connectors.

UNIT V OPTICAL COMMUNICATION SYSTEMS AND NETWORKS

System design consideration Point – to –Point link design –Link power budget –rise time budget, WDM – Passive DWDM Components-Elements of optical networks-SONET/SDH.Optical Interfaces-SONET/SDH Rings and Networks-High speed light wave Links-OADM configuration-Optical ETHERNET-Soliton

TEXT BOOKS:

1) Gerd Keiser, "Optical Fiber Communication" Mc Graw -Hill International, 4th Edition., 2010.

2) John M. Senior , "Optical Fiber Communication", Second Edition, Pearson Education, 2007.

REFERENCES:

1) Ramaswami, Sivarajan and Sasaki "Optical Networks", Morgan Kaufmann, 2009.

2) J.Senior, "Optical Communication, Principles and Practice", Prentice Hall of India, 3rd Edition, 2008.

3) J.Gower, "Optical Communication System", Prentice Hall of India, 2001.

Subject Code	Subject Name	Credit Lecture (L-T-P)			Total Credits
LM301	Engineering Economics	2	1	0	8

Unit 1- INTRODUCTION TO ECONOMICS:

Introduction to economics – Flow in an economy – Law of supply and demand – Concept of engineering economics – Engineering efficiency – Economic efficiency – Scope of engineering economics – Element of costs – Marginal cost – Marginal revenue – Sunk cost – Opportunity cost – Break-even analysis – V ratio – Elementary economic analysis – Material selection for product design selection for a product – Process planning.

Unit 2- VALUE ENGINEERING:

Make or buy decision – Value engineering – Function – Aims – Value engineering procedure – Interest formulae and their applications –Time value of money – Single payment compound amount factor – Single payment present worth factor – Equal payment series sinking fund factor – Equal payment series payment Present worth factor – Equal payment series capital recovery factor – Uniform gradient series annual equivalent factor – Effective interest rate – Examples all methods.

Unit 3- CASH FLOW:

Methods of comparison of alternatives – Present worth method (Revenue dominated cash flow diagram) – Future worth method (Revenue dominated cash flow diagram, cost dominated cash flow diagram) – Annual equivalent method (Revenue dominated cash flow diagram, cost dominated cash flow diagram) – Rate of return method – Examples all methods.

TEXT BOOKS:-
- PanneerSelvam, R., "Engineering Economics", Prentice Hall of India Ltd, 2001.
- Smith, G.W., "Engineering Economy", Lowa State Press, 1973.

REFERENCE BOOKS:-
- Park, C.S., "Contemporary Engineering Economics", Prentice Hall of India, 2002.
- Newman, D.G. and Lavelle, J.P., "Engineering Economics and Analysis", Engineering Press, 2002.
- Degarmo, E.P., Sullivan, W.G. and Canada, J.R, "Engineering Economy", Macmillan, 1984.
- Grant, E.L., Ireson, W.G. and Leavenworth, R.S., "Principles of Engineering Economy", Ronald Press, 1976.

Subject Code	Subject Name	Credit Lecture (L-T-P)			Total Credits
HU301	Humanities	2	0	0	6

Unit - 1: Introduction to Sociology

Definition of sociology, some sociological concepts: social structure, status, role, norms, values etc. Socialization, and culture and change.

Social stratification - various approaches and concept of social mobility.

Population and society - Trends of demographic change in India and the world, Human Ecology, Trends of Urbanization in the developing countries and the world.

Major social institutions - Family and marriage, caste and tribe and organizations: (i) formal organization (bureaucracy) (ii) informal organization.

Processes of social change - Modernization (including Sanskritization), industrialization, environmental/ecological changes and development.

Social movements - protest movements, reformist movement and radical movements in India.

Unit - 2: Introduction to Literature

Nature of Literature: Literature as a Humanistic Experience. Definitions: (i) Humanities: concern with culture, values, ideologies; (ii) Literature: concepts of imitation, expression, intuition & imagination. Major Themes of Literature: Nature, Science, Selfhood, Love, Rebellion.

The Language of Literature: Modes of literary and non-literary expression. The concepts of Figurative language, imagery, symbolism, style. The Forms of Literature: Prose Narratives (short stories & novels) Poetry, Drama and Essays (Suitable texts are to be chosen by the instructors), Use of a Learner Dictionary.

Unit - 3: Introduction to Philosophy

Philosophy and History of Science: Growth of scientific knowledge: factors leading to the emergence of modern science. Conceptual evolution: internal and external history. Methodology of science: induction, falsificationism, confirmation and probability. Nature of scientific laws and theories: realism, instrumentalism and under-determination. Relationship between scientific observation, experiment and scientific theory. Nature of scientific explanation: teleological explanations and the covering law model. Selected case studies on scientific theories.

Logic and the nature of mathematical reasoning: Inductive and deductive forms of reasoning. Nature of axioms: formal axiomatic systems. Concept of consistency, independence and completeness.Nature of rules of inference and proof.Selected examples of axiomatic systems and proof procedures.

Cognition: Current approaches to the understanding of mind and mental processes: empiricist, rationalist, behaviorist and cognitivist.

Ethics: Impact of science and technology on man and society: elements of environmental and professional ethics.

TEXT / REFERENCE BOOKS:-

(A) Introduction to Sociology:

    (a) L. Broom, P. Selznick and D. Dorrock, Sociology, 11th Edn. 1990 (Harper International).

    (b) M. Haralambos, Sociology: Themes and Perspectives, Oxford University Press, 980.

    (c) M.S.A. Rao (ed) Social movements in India, vols. 1-2, 1984, Manohar.

    (d) David Mandelbaum, Society in India, 1990, Popular.

    (e) M.N. Srinivas, Social change in modern India, 1991, Orient Longman.

    (f) Guy Rocher, A. General Introduction to Sociology, MacMillan, 1982.

(B) Introduction to Literature:

    (a) David Murdoch (ed.). The Siren's Song: An Anthology of British and American Verse, Orient Longman, 1988.

    (b) S. Alter & W. Dissanayake (eds.) The Penguin Book of Modern Indian Short Stories. Penguin Books (India), 1989.

    (c) Bertrand Russell, Impact of Science on Society. Allen &Unwin, 1952.

    (d) Henrik Ibsen, A Doll's House, Macmillan India, 1982.

    (e) George Orwell, Animal Farm, Penguin, 1951.

    (f) J. Bronowski. The Ascent of Man, BBC, 1973.

(C) Introduction to Philosophy:

    (a) A.C. Grayling (ed.) Philosophy: A Guide through the subject, Oxford Univ. Press, London, 1995.

    (b) Marx W. Wartofsky, Conceptual Foundations of Scientific Thought: An Introduction to the Philosophy of Science, Macmillan, London, 1968.

    (c) I.B. Cohen, The Birth of a New Physics, Vakils, Feffer and Simons Pvt. Ltd., Bombay, 1968.

    (d) H. Eves and C.V. Newsom, Foundations and Fundamental Concepts of Mathematics, Boston, PWS-Kart Pub. Co., 1990.

    (e) K.E. Goodpaster and K.M. Sayre (eds.) Ethics and Problems of 21st Century, Univ. of Notre Dame Press, London, 1979.

    (f) S.D. Agashe, A. Gupta & K. Valicha (eds.) Scientific Method, Science, Technology and Society: A Book of Readings, Univ. of Bombay Press, 1963.

<u>**Syllabus**</u>

<u>**Semester VI**</u>

Subject Code	Subject Name	Credit Lecture (L-T-P)			Total Credits
DC 305	Computer aided PCB Design	3	0	2/2	9

Unit-1: Computer Aided Electrical Drawing

Procedure to be adopted for computer aided drawings Electrical machines - AC and DC, motor starters, measuring and display instruments etc R-L series, parallel circuit R-C series, parallel circuit R-L-C series, parallel circuit D.C. machine parts and cross sectional view A.C. machine parts and cross sectional view A.C. and D.C. winding diagrams Lighting and power wiring diagram

Unit-2: Computer Aided Electronics Drawing

Symbols and notations of: Electronic components - Resistor, Inductor, transformer and Capacitor Semiconductor device Diodes, Zener diode, Transistors PNP/ NPN, Tunnel diode, photo diode, varactor, FET, MOSFET,IGBT, UJT etc. Half-wave, full-wave and bridge rectifier, Power amplifier and voltage amplifier and different types of oscillators circuits

Unit-3: Simulation of Electrical Circuits

Getting started, ending, commonly used blocks, Creating a model, Assigning Variables, Observing Variables during Simulation, Storing/Saving Data, Creating and Masking Sub-systems Series and parallel R-L circuit, Series and parallel R-C circuit, Series and parallel R-L-C circuit Resonance in AC Circuit and Electrical machines circuits Graphics, Plot, sub plot, label, legend etc.

Unit-4: Simulation of Electronics Circuits

Half wave, full wave and bridge rectifier Power amplifier and voltageamplifier Different types of oscillators circuits

Unit-5: Computer Aided PCB Design

Overview of software for PCB design PCB layout of rectifier circuit PCB layout of amplifier circuit PCB layout of oscillator circuit

RECOMMENDED BOOKS:-

1) AutoCAD 2013 for Engineers and Designers, Sham Tickoo   Dream tech press, New Delhi, Latest edition.
2) Mastering AutoCAD 2013 and AutoCAD LT 2013   George Omura Sybex, New Delhi, Latest edition
3) Mastering electronics workbench:Version 5 and Multisim Version 6 John AdamsMcGraw-Hill, New Delhi, Latest edition

4) Introduction to PSpice Using OrCAD For Circuits And Electronics   Muhammad H;Rashid

     PHI Learning, New Delhi, Latest edition

Subject Code	Subject Name	Credit Lecture (L-T-P)			Total Credits
DC 306	Embedded System	2	0	0	6

Unit 1-INTRODUCTION TO EMBEDDED SYSTEM

• History & need of Embedded System

• Basic components of Embedded System

• Programming Language Classification of Embedded System

• Advantage & Disadvantage

Unit 2-MICROPROCESSOR & MICROCONTROLLER CLASSIFICATION

• Difference between Microprocessor & Microcontroller

• Classification based on architecture

• Memory Classification

Unit 3-REGISTERS & MEMORY OF AT89C51

• Description of RAM

• Description of CPU Registers

• Functions of SFR

Unit 4-INTRODUCTION OF EMBEDDED C

• Introduction to Embedded C

• Difference between C & Embedded C

• Programming style

• Basic structure of C program

Unit 5-CONSTANTS, VARIABLES & DATA TYPES

• Keywords & Identifiers

• Data type & its memory representation

• Arrays and strings

Unit 6- OPERATORS

• Types of Operators

• Bitwise Operators explained

TEXTBOOKS:

1.Embedded Systems Architecture Programming and Design by Raj Kamal, II edition, Tata MC Graw-Hill.

2. Designing Embedded Systems with PIC Microcontrollers: principles and applications by Tim Wilmshurst, Elsevier.

REFERENCES:

1. Embedded Systems Design by Steve Heath, II edition, Newnes publications

2. Embedded Systems Architecture: A Comprehensive Guide for Engineers and Programmers by Tammy Noergaard, Elsevier.

Subject Code	Subject Name	Credit Lecture (L-T-P)			Total Credits
DC 307	Industrial Automation	3	0	0	9

Unit-1 Introduction:

Automation overview, Requirement of automation systems, Architecture of Industrial Automation system, Introduction of PLC and supervisory control and data acquisition (SCADA). Industrial bus systems: modbus & profibus.

Unit-2 Automation components:

Sensors for temperature, pressure, force, displacement, speed, flow, level, humidity and pH measurement. Actuators, process control valves, power electronics devices DIAC, TRIAC, power MOSFET and IGBT. Introduction of DC and AC servo drives for motion control.

Unit-3 Computer aided measurement and control systems:

Role of computers in measurement and control, Elements of computer aided measurement and control, man-machine interface, computer aided process control hardware, process related interfaces, Communication and networking, Industrial communication systems, Data transfer techniques, Computer aided process control software, Computer based data acquisition system, Internet of things (IoT) for plant automation .

Unit-4 Programmable logic controllers:

Programmable controllers, Programmable logic controllers, Analog digital input and output modules, PLC programming, Ladder diagram, Sequential flow chart, PLC Communication and networking, PLC selection, PLC Installation, Advantage of using PLC for Industrial automation, Application of PLC to process control industries.

Unit-5 Distributed Control System:

Overview of DCS, DCS software configuration, DCS communication, DCS Supervisory Computer Tasks, DCS integration with PLC and Computers, Features of DCS, Advantages of DCS.

Unit-6 Overview of Industrial automation using robots:

Basic construction and configuration of robot, Pick and place robot, Welding robot.

RECOMMENDED BOOKS:

[1] Industrial Instrumentation and Control By. S.K. Singh The McGraw Hill Companies

[2] Process Control Instrumentation Technology By. C.D. Johnson, PHI

[3] Industrial control handbook, Parr, Newnem

[4] Programmable logic controller, Dunning, Delmar

Subject Code	Subject Name	Credit Lecture (L-T-P)			Total Credits
DC 308	Programing for Embedded System	2	0	2/2	7

UNIT 1

INTRODUCTION TO ASSEMBLY LANGUAGE AND DATAREPRESENTATION IN C

Assembly language programming – macros - Data representation – Twos complement, fixed point and floating point number formats –Low level programming in C: Primitive data types – Pointers – Structures – Unions – Dynamic memory allocation – Functions – recursive functions - Linked lists.

UNIT II

PROGRAMMING IN C

Register usage conventions – Typical use of addressing options – Instruction sequencing – Procedure call and return – Functions – recursive functions - Parameter passing – Retrieving parameters – Everything in pass by value – Temporary variables – threads – preemptive kernels – system timer – scheduling.

UNIT III

OBJECT ORIENTED PROGRAMMING

Object oriented analysis and design - C++ classes and objects – functions – data structures - examples.

UNIT IV

UNIFIED MODELING LANGUAGE

Connecting the object model with the use case model – Key strategies for object identification – UML basics. Object state behavior – UML state charts – Role of scenarios in the definition of behavior – Timing diagrams – Sequence diagrams – Event hierarchies – types and strategies of operations – Architectural design in UML concurrency design – threads in UML.

UNIT V

EMBEDDED SOFTWARE DEVELOPMENT TOOLS AND RTOS

The compilation process – libraries – porting kernels – C extensions for embedded systems –
emulation and debugging techniques – RTOS - system design using RTOS .

REFERENCES:

1. Daniel W. Lewis, "Fundamentals of embedded software where C and assembly meet",
Pearson Education, 2002.

2. Bruce Powel Douglas, "Real time UML, second edition: Developing efficient objects for
embedded systems", 3rd Edition 1999, Pearson Education.

3. Steve Heath, "Embedded system design", Elsevier, 2003.

4. David E. Simon, "An Embedded Software Primer", Pearson Education, 2003.

5. E. Balaguruswamy, "Object oriented programming with C++", Tata McGraw Hill, 2011.

Subject Code	Subject Name	Credit Lecture (L-T-P)			Total Credits
DE301	Biomedical Electronics&Instrumentation	3	0	0	9

UNIT I- FUNDAMENTALS OF BIOMEDICAL ENGINEERING

Cell and its structure – Resting and Action Potential – Nervous system and its fundamentals - Basic components of a biomedical system- Cardiovascular systems- Respiratory systems -Kidney and blood flow - Biomechanics of bone - Biomechanics of soft tissues - Basic mechanics of spinal column and limbs -Physiological signals and transducers - Transducers – selection criteria – Piezo electric, ultrasonic transducers - Temperature measurements - Fibre optic temperature sensors.

UNIT II- NON ELECTRICAL PARAMETERS MEASUREMENT AND DIAGNOSTIC PROCEDURES

Measurement of blood pressure - Cardiac output - Heart rate - Heart sound - Pulmonary function measurements – spirometer – Photo Plethysmography, Body Plethysmography – Blood Gas analysers, pH of blood –measurement of blood pCO2, pO2, finger-tip oxymeter - ESR, GSR measurements.

UNIT III- ELECTRICAL PARAMETERS ACQUISITION AND ANALYSIS

Electrodes – Limb electrodes –floating electrodes – pregelled disposable electrodes - Micro, needle and surface electrodes – Amplifiers, Preamplifiers, differential amplifiers, chopper amplifiers – Isolation amplifier - ECG – EEG – EMG – ERG – Lead systems and recording methods – Typical waveforms - Electrical safety in medical environment, shock hazards – leakage current-Instruments for checking safety parameters of biomedical equipments.

UNIT IV- IMAGING MODALITIES AND ANALYSIS

Radio graphic and fluoroscopic techniques – Computer tomography – MRI – Ultrasonography – Endoscopy – Thermography –Different types of biotelemetry systems - Retinal Imaging - Imaging application in Biometric systems - Analysis of digital images.

UNIT V- LIFE ASSISTING, THERAPEUTIC AND ROBOTIC DEVICES

Pacemakers – Defibrillators – Ventilators – Nerve and muscle stimulators – Diathermy – Heart – Lung machine – Audio meters – Dialysers – Lithotripsy - ICCU patient monitoring system - Nano Robots - Robotic surgery – Advanced 3D surgical techniques- Orthopedic prostheses fixation.

REFERENCES:

1. "Principles of Applied Biomedical Instrumentation",L.A.Geddes & L.E.Baker, Wiley India Pvt.Ltd, Third Edition, 1989.

2. "Handbook of Biomedical Instrumentation", R.S. Khandpur, Second Edition, Tata McGraw Hill, 2003.

3. "Handbook of Analytical Instruments", Khandpur R S, Tata McGraw Hill,1989

4. "Biomedical Instrumentation",Shakthi Chatterjee & Aubert Miller, CENGAGE Learning, 2010.

5. "Handbook of Biomedical Instrumentation",Chanderlekha Goswami, Manglam Publications, 2010.

6. "Medical Instrumentation: Application and Design",John G.Webster, Wiley India Pvt.Ltd, Third Edition, 2002.

7. "The Biomedical Engineering Handbook",Joseph D. Bronzino, CRC Press, 1995.

8. "Encyclopedia of Medical Devices and Instrumentation",John G. Webster, Second Edition, Wiley Interscience, 2006.

9."Principles of Biomedical Instrumentation and Measurements",Richard Aston, Merril Publishing Co, 1990.

10. "Telemedicine: Medicine and Communication", Thorsten M Buzug, Heinz Handels, Dietrich Holz, Springer Verlag, 2001.

Subject Code	Subject Name	Credit Lecture (L-T-P)			Total Credits
DE301	Advanced Microcontrollers	3	0	0	9

UNIT I : HIGH PERFORMANCE CISC ARCHITECTURE – PENTIUM

CPU Architecture- Bus Operations – Pipelining – Brach predication – floating point unit- Operating Modes –Paging – Multitasking – Exception and Interrupts – Instruction set – addressing modes – Programming the Pentium processor.

UNIT II : HIGH PERFORMANCE RISC ARCHITECTURE – ARM

Arcon RISC Machine – Architectural Inheritance – Core & Architectures – Registers – Pipeline – Interrupts – ARM organization – ARM processor family – Co-processors – ARM instruction set- Thumb Instruction set – Instruction cycle timings – The ARM Programmer"s model – ARM Development tools – ARM Assembly Language Programming – C programming – Optimizing ARM Assembly Code – Optimized Primitives.

UNIT III : ARM APPLICATION DEVELOPMENT

Introduction to DSP on ARM –FIR filter – IIR filter – Discrete fourier transform – Exception handling – Interrupts – Interrupt handling schemes- Firmware and bootloader – Embedded Operating systems – Integrated Development Environment- STDIO Libraries – Peripheral Interface – Application of ARM Processor – Caches – Memory protection Units – Memory Management units – Future ARM Technologies.

UNIT IV Advanced concepts in 8051 architecture:

Review of 8051 architecture, concept of synchronous serial communication, SPI and I2C communication protocols, study of SPI port on 89LP 51RD2, study of SAR ADC/DAC MCP3304 / MCP 33, interfacing concepts for SPI based ADC/DAC, study of watchdog timer, study of PCA timer in different modes like capture mode, PWM generation mode, High speed output toggle mode Embedded 'C' programming for the above peripherals

TEXT BOOKS:

1) Andrew N.Sloss, Dominic Symes and Chris Wright " ARM System Developer"s Guide : Designing and Optimizing System Software" , First edition, Morgan Kaufmann Publishers, 2004.

REFERENCES:

1) Steve Furber , "ARM System –On –Chip architecture", Addision Wesley, 2000.
2) Daniel Tabak , "Advanced Microprocessors", Mc Graw Hill. Inc., 1995
3) James L. Antonakos , " The Pentium Microprocessor", Pearson Education, 1997.
4) Gene .H.Miller, "Micro Computer Engineering", Pearson Education , 2003.
5) John .B.Peatman , "Design with PIC Microcontroller", Prentice Hall, 1997.

6) James L.Antonakos, "An Introduction to the Intel family of Microprocessors", Pearson Education, 1999.
7) Barry.B.Brey,"The Intel Microprocessors Architecture, Programming and Interfacing", PHI,2002.
8) Valvano, "Embedded Microcomputer Systems", Thomson Asia PVT LTD first reprint 2001.
Readings: Web links www.ocw.nit.edu www.arm.com

Subject Code	Subject Name	Credit Lecture (L-T-P)			Total Credits
DE301	Advance Microprocessors & Interface	3	0	0	9

UNIT 1- 8086 MICROPROCESSOR ARCHITECTURE , FEATURES AND SIGNALS

Salient features of 8086, Internal architecture of 8086, Signal descriptions of 8086, Real addressing mode, Protected virtual address mode, Privilege, Protection, Special operation

UNIT 2- 80286- A MIRCORPOCESSOR WITH MEMORY MANAGEMENT & PROTECTION:

Salient features of 80286, Internal architecture of 80286, Signal descriptions of 80286, Real addressing mode, Protected virtual address mode, Privilege, Protection, Special operation, 80286 Bus interface, Basic Bus operation, Fetch cycles of 80286, 80286 Minimum system configuration, Interfacing memory and I/O devices with 80286, Priority of bus use by 80286, Bus Hold and HLDA sequence, Interrupt acknowledge sequence, Instruction set features.

UNIT 3-80386, 80486 – THE 32 BIT PROCESSOR

Salient feature of 80386, Architecture and signal description of 80386, Register organization of 80386, Addressing modes, Coprocessor 80387.

UNIT 4- AN INTRODUCTION TO THE PENTIUM MICROPROCESSOR

Salient features, Internal architecture, Signal descriptions, Real addressing mode, Protected virtual address mode, Privilege, Protection, Special operation.

UNIT 5-INTERFACING AND PROGRAMMABLE DEVICES FOR 8086 BASED SYSTEMS

Interfacing of Co-Processor, Switches, LED's, Analog to Digital Converter, Digital To Analog Convertor, DC and Stepper Motor, Seven segment and LCD display with 8086

RECOMMENDED BOOKS:

1) A. K. Ray & K. M. Bhurchandi- Advanced Microprocessor and Peripherals- Tata Mcgraw Hill.
2) B. P. Singh – Advanced Microprocessor and Microcontrollers- New Age International.
3) Brey, Barry B – Intel Microprocessor
4) D. V. Hall – Micro process Interfacing
5) e-books/e-tools/relevant software to be used as recommended by AICTE/NITTTR, Chandigarh.
6) "An Introduction to the Intel Family of Microprocessor," by J. L. Antonacos.

Subject Code	Subject Name	Credit Lecture (L-T-P)			Total Credits
DE301	Analytical Instrumentation	3	0	0	9

UNIT 1 INTRODUCTION:

Introduction to Chemical instrumental analysis, Advantages over classical methods, Beer Lambert's law. Classification: Spectral, electro analytical and separative methods, Basic Components of analytical instruments. General Laboratory Instruments: Centrifuge, Autoclave, Balances, Hot Air Oven.

UNIT 2 MICROSCOPY:

Bright field microscopy, Dark field microscopy, Phase contrast microscopy, electron microscopy & their importance in clinical diagnosis.

UNIT 3 COLORIMETERS AND SPECTROPHOTOMETERS:

Colorimeters: Principle, Constructional details, Single and double beam instruments, Sources and detectors, Application. Spectrophotometers: UV-Visible spectrophotometer, IR spectrophotometers. Flame Photometry: Principle, Constructional details, Application. Mass

Spectrometer (MS): Principle, Constructional details, Ionization methods, X-ray spectrometry: Instrumentation for X-ray spectrometry, X-ray diffractometer.

UNIT 4 BLOOD GAS ANALYZERS:

Blood pH Measurement, Measurement of blood pCO2, calculated bicarbonate, Total CO2 and Base excess, Blood pO2 measurement, Complete blood gas analyzer.

UNIT 5 CHROMATOGRAPHY:

Classification, Gas chromatography: Principle, Constructional details, GC detectors, Liquid Chromatography, High Performance Liquid Chromatography (HPLC): Principle, constructional details.

UNIT 6 BLOOD CELL COUNTERS :

Types of blood cells, Methods of cell counting, Automatic recognition and differential counting of cells.

UNIT 7 ELECTROPHORESIS:

Overview of electrophoresis, Types of Electrophoresis, Basis for electrophoretic separations, various types of detection in capillary electrophoresis, Applications to biomolecules.

TEXT BOOKS:

1. Handbook of Analytical Instruments By R. S. Khandpur, Tata McGraw–Hill Publications, 3rd edition

2. Introduction to Instrumental Analysis By Robert D. Braun, McGraw-Hill Book Company

REFERENCE BOOKS:

1. Instrumental Methods of Analysis By Willard, Merritt, Dean, Settle CBS Publishers & Distributors, New Delhi, Seventh edition

2. Principles of Instrumental Analysis By Skoog, Holler, Nieman Thomson books-cole publications, 5th edition

3. Instrumental Methods of Chemical Analysis By Galen W. Ewing McGraw-Hill Book Company, Fifth edition.

Subject Code	Subject Name	Credit Lecture (L-T-P)			Total Credits
DE301	Troubleshooting of Electronic Equipment	3	0	0	9

Unit 1 : Fundamental Troubleshooting Procedures

Inside An Electronic Equipment: Reading Drawings And Diagrams – Block Diagram, Circuit Diagram, Wiring Diagram; Dis-assembly and re-assembly of equipment, Equipment Failures and causes such as poor design, production deficiencies, careless storage and transport, inappropriate operating conditions, Nature of faults, Fault location procedure, Fault finding aids – Service and

maintenance manuals and instruction manuals, Test and Measuring instruments, special tools Troubleshooting techniques, Approaching components for tests, Grounding systems in Electronic Equipment, Temperature sensitive Intermittent problems Corrective actions, Situations where repairs should not be attempted

Unit 2 : Passive Components and Their Testing

Passive Components- Resistors, Capacitors, Inductors Failures in fixed resistors, testing of resistors, variable resistors, variable resistors as potentiometers, failures in potentiometers, testing of potentiometers, servicing potentiometers, LDRs and Thermistors Types of capacitors and their performance, Failures in capacitors, testing of capacitors and precautions therein, variable capacitor types, Testing of inductors and inductance measurement

Unit 3 : Testing of Semiconductor Devices

Types of semiconductor devices, Causes of failure in Semiconductor Devices, Types of failure

Test procedures for Diodes, special types of Diodes, Bipolar Junction Transistors, Field Effect Transistors, Thyristors Operational Amplifiers, Fault diagnosis in op-amp circuits.

RECOMMENDED BOOKS:

1. Modern Electronic Equipment: Troubleshooting, Repair and Maintenance by Khandpur, TMH 2006
2. Electronic Instruments and Systems: Principles, Maintenance and Troubleshooting by R. G. Gupta Tata McGraw Hill Edition 2001
3. Student Reference Manual for Electronic Instrumentation Laboratories by Stanley Wolf, and Richard F. M. Smith, Prentice Hall of India Pvt. Ltd. New Delhi
4. Consumer Electronics by S. P. Bali, Pearson
5. Opamps - Design, Application and Troubleshooting by David L Terrell, Butterworth-Heinemann
6. Electronic Testing and Fault Diagnosis by G. C. Loveday, A. H. WheelerPublishing