LAKIREDDY BALIREDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

(Approved by AICTE, Affiliated to JNTUK, Accredited by NBA, ISO 9001 : 2008 Certified & Accredited by **NAAC with "A" Grade)**

B.TECH. FOUR YEAR DEGREE COURSE

(Applicable for the batches admitted from 2011-12)

ELECTRONICS AND INSTRUMENTATION ENGINEERING

L.B.Reddy Nagar :: Mylavaram – 521 230 :: Krishna District
ANDHRA PRADESH STATE

COURSE STRUCTURE(2011-2012 Admitted Batch)

I SEMESTER

Code No.	Name of the Course	Scheme of Instruction			Scheme of Examination		Total	Credits
		Periods per Week			Maximum Marks			
		Lectures	Tutorial	Lab.	Internal	External		
T118	Applied Mathematics-I	4	1	--	25	75	100	4
T131	C Programming	4	1	--	25	75	100	4
T197	English-I	4	--	--	25	75	100	3
T191	Engineering Chemistry	4	--	--	25	75	100	3
T195	Engineering Physics	4	1	---	25	75	100	4
P806	C Programming Lab	--	--	3	25	75	100	2
P830	Engineering Physics and Chemistry Lab.	--	--	3	25	75	100	2
P831	Engineering Workshop	--	--	3	25	75	100	2
	TOTAL	**20**	**3**	**9**	**200**	**600**	**800**	**24**

II SEMESTER

Code No.	Name of the Course	Scheme of Instruction			Scheme of Examination		Total	Credits
		Periods per Week			Maximum Marks			
		Lectures	Tutorial	Lab.	Internal	External		
T119	Applied Mathematics - II	4	1	--	25	75	100	4
T198	English - II	4	--	--	25	75	100	3
T264	Numerical Methods	4	1	--	25	75	100	4
T136	Classical Mechanics	4	1	--	25	75	100	4
T199	Environmental Studies	4	--	3	25	75	100	3
T135	Circuit Theory	4	1	--	25	75	100	4
P829	Engineering Drawing through Autocad lab	--	--	3	25	75	100	2
P832	English Language Communication skills lab	--	--	3	25	75	100	2
P856	Mini Project - I	--	--	3	25	25	50	2
	TOTAL	**24**	**4**	**12**	**225**	**625**	**850**	**28**

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III SEMESTER

Code No.	Name of the Course	Scheme of Instruction			Scheme of Examination		Total	Credits
		Periods per Week			Maximum Marks			
		Lectures	Tutorial	Lab.	Internal	External		
T188	Electronic Devices and Circuit	4	--	--	25	75	100	5
T186	Electro Magnetic Fields	4	1	--	25	75	100	4
T320	Switching Theory and Digital Logic	4	1	---	25	75	100	4
T245	Managerial Economics and Financial analysis	4	1	--	25	75	100	3
T294	Pulse and Digital Circuits	4	1	--	25	75	100	4
T206	Fluid Mechanics and Thermal Engineering	4	1	--	25	75	100	4
P827	Electronic Devices and Circuit using LabView	--	--	3	25	75	100	2
P869	Pulse and Digital Circuits Lab	--	--	3	25	75	100	2
P870	Seminar – I	--	--	1	50	--	50	1
	TOTAL	**24**	**5**	**7**	**250**	**600**	**850**	**29**

IV SEMESTER

Code No.	Name of the Course	Scheme of Instruction			Scheme of Examination		Total	Credits
		Periods per Week			Maximum Marks			
		Lectures	Tutorial	Lab.	Internal	External		
T187	Electronic Circuits	4	-	--	25	75	100	4
T133	Calibration and Electronics Measurements	4	1	--	25	75	100	4
T220	Industrial Instrumentation	4	1	--	25	75	100	5
T184	Electrical Technology	4	1	---	25	75	100	4
T304	Sensors and Signal Conditioning	4	1	--	25	75	100	4
P825	Electrical Technology Lab	-	-	3	25	75	100	2
P839	Instrumentation-I Lab	-	--	3	25	75	100	2
P826	Electronic Circuits Lab	-	--	3	25	75	100	2
P857	Mini-project - II	-	--	1	25	25	50	2
	TOTAL	**20**		**10**	**225**	**625**	**850**	**29**

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V SEMESTER

Code No.	Name of the Course	Scheme of Instruction			Scheme of Examination		Total	Credits
		Periods per Week			Maximum Marks			
		Lectures	Tutorial	Lab.	Internal	External		
T235	Linear and Digital IC Applications	4	1	--	25	75	100	4
T306	Signals and Systems	4	1	--	25	75	100	4
T148	Control Systems	4	1	--	25	75	100	4
T146	Computer Organization	4	1	--	25	75	100	3
T254	Micro Processor and Interfacing	4	--	--	25	75	100	4
T287	Process Control Instrumentation	4	1	-	25	75	100	4
T290	Professional Ethics	4	--	--	25	75	100	3
P847	Linear IC Applications Lab	--	--	3	25	75	100	2
P865	Process Control Lab	--	--	3	25	75	100	2
P871	Seminar - II	--	--	1	50	--	50	1
	TOTAL	28	5	7	275	675	950	31

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VI SEMESTER

Code No.	Name of the Course	Scheme of Instruction			Scheme of Examination		Total	Credits
		Periods per Week			Maximum Marks			
		Lectures	Tutorial	Lab.	Internal	External		
T125	Automation of Industrial Process	4	1	--	25	75	100	4
T221	Industrial Management	4	--	--	25	75	100	3
T140	Communication System	4	1	--	25	75	100	4
T266	Object orient programming (C++)	4	1	--	25	75	100	4
T253	Micro Controller and Application	4	1	--	25	75	100	4
T277 T336 T225 T224	**ELECTIVE – I** Power Plant Instrumentation Virtual Instrumentation Instrumentation and Control In Petro Chemical Industries Instrumentation and Control In Paper and Pulp Industries	4	--	-	25	75	100	3
P852	Micro Processors and Micro Controllers Applications Lab	-	--	3	25	75	100	2
P840	Instrumentation - II Lab	-	--	3	25	75	100	2
P810	Comprehensive Viva-voce - I	--	--	--	100	--	100	2
	TOTAL	**24**	**4**	6	**300**	**600**	**900**	**28**

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VII SEMESTER

Code No.	Name of the Course	Scheme of Instruction Periods per Week			Scheme of Examination Maximum Marks		Total	Credits
		Lectures	Tutorial	Lab.	Internal	External		
T272	OPTO Electronics and Laser Instrumentation	4	1	--	25	75	100	4
T273	P. C. Based Instrumentation	4	--	--	25	75	100	4
T115	Analytical Instrumentation	4	1	--	25	75	100	4
T338	VLSI Design	4	1	--	25	75	100	4
T163	Digital Signal Processing	4	1	--	25	75	100	4
T262 T122 T252 T161	**ELECTIVE-II** Neural Networks and Fuzzy Logic Artificial Intelligence Micro Electro Mechanical Systems (MEMS) Digital Image Processing	4	--	--	25	75	100	3
P820	Digital Signal Processing Lab	-	--	3	25	75	100	2
P841	Instrumentation - III Lab	-	--	3	25	75	100	2
P843	Term Paper	--	--	1	25	25	50	2
P878	Internship	--	--	2	50		50	2
	TOTAL	**24**	**4**	**9**	**275**	**625**	**900**	**31**

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VIII SEMESTER

Code No.	Name of the Course	Scheme of Instruction			Scheme of Examination		Total	Credits
		Periods per Week			Maximum Marks			
		Lectures	Tutorial	Lab.	Internal	External		
T218	Industrial Electronics	3	--	--	25	75	100	4
	ELECTIVE - III							
T243	Management Information Systems							
T190	Embedded Systems Design	3	--	--	25	75	100	3
T322	Telemetry and Tele Control							
T106	Advanced Sensors							
	ELECTIVE - IV							
T159	Digital Control Systems							
T169	DSP Processors and Architectures	3	-	---	25	75	100	3
T300	Robotics							
T128	Biomedical Instrumentation							
P811	Comprehensive Viva-Voce - II	--	--	--	100	--	100	2
P867	Project Work	--	--	6	60	140	200	8
	TOTAL	**9**	**-**	**6**	**235**	**365**	**600**	**20**
TOTAL CREDITS : 220								

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I-SEMESTER

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T118 – APPLIED MATHEMATICS – I

Lecture	**: 4 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**: 1 Period/Week**	**External Marks**	**: 75**
Credits	**: 4**	**External Examination**	**: 3 Hrs**

UNIT - I

Differential equations of first order and first degree – exact, linear and Bernoulli. Applications to Newton's Law of cooling, Law of natural growth and decay, orthogonal trajectories.

UNIT - II

Linear differential equations of second and higher order with constant coefficients and with variable coefficients, method of variation of parameters and their simple applications to Simple Harmonic Motion and Electrical Circuits.

UNIT - III

Generalized Mean Value theorems (without proof), Functions of several variables, Maxima and Minima of functions of two variables with constraints and without constraints. Lagrangian Multiplier method.

UNIT - IV

Curve tracing – Cartesian curves. Applications of Integration to Lengths, Volumes and Surface areas of revolution in Cartesian Coordinates. Multiple integrals - double and triple integrals (Cartesian Coordinates only) – Changing of order of Integration. (Cartesian Coordinates only)

UNIT - V

Vector Differentiation: Gradient- Divergence - Curl and their related properties of sums-products - Laplacian and second order operators. Vector Integration - Line integral – work done – Potential function – area - surface and volume integrals Vector integral theorems: Greens, Stokes and Gauss Divergence Theorems (Without proof) and related problems.

TEXT BOOKS

1. Higher Engineering Mathematics by Dr. B.S. Grewal
2. Higher Engineering Mathematics by Dr. B. V. Ramana – TMGH

REFERENCES

1. Advanced Engineering Mathematics by M. D. Greenberg – TMGH
2. Advanced Engineering Mathematics by Erwin Krezig - John Wiley & sons
3. Elementary Differential equations by W. E. Boyce and R. C. Diprima - John Wiley & sons
4. Advanced Engineering Mathematics by Peter V. O. Neil - Thomson

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T131 – C - PROGRAMMING

Lecture	**: 4 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**: 1 Period/Week**	**External Marks**	**: 75**
Credits	**: 4**	**External Examination**	**: 3 Hrs**

UNIT - I

Algorithm / pseudo code, flowchart, program development steps, structure of C program, A Simple C program, identifiers, basic data types and sizes, Constants, variables, arithmetic, relational and logical operators, increment and decrement operators, conditional operator, bit-wise operators, assignment operators, expressions, type conversions, conditional expressions, precedence and order of evaluation.
Input-output statements, statements and blocks, if and switch statements, loops- while, do-while and for statements, break, continue, goto and labels, programming examples.

UNIT - II

Designing structured programs, Functions, basics, parameter passing, storage classes-extern, auto, register, static, scope rules, block structure, user defined functions, standard library functions, recursive functions, header files, C preprocessor, example c programs.

UNIT - III

Arrays- concepts, declaration, definition, accessing elements, storing elements, arrays and functions, two dimensional and multi-dimensional arrays, applications of arrays. pointers-concepts, initialization of pointer variables, pointers and function arguments, address arithmetic, Character pointers and functions, pointers to pointers, pointers and multidimensional arrays, dynamic memory managements functions, command line arguments, c program examples.

UNIT - IV

Derived types- structures- declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bitfields, C program examples.

UNIT - V

Input and output – concept of a file, text files and binary files, streams, standard I/o, Formatted I/o, file I/o operations, error handling, C program examples.

TEXT BOOKS

1. Computer science, A structured programming approach using C, B.A. Forouzan and R.F. Gilberg, Third edition, Thomson.
2. The C Programming Language, B.W. Kernighan, Dennis M.Ritchie, PHI/Pearson Education

REFERENCES

1. C Programming with problem solving, J.A. Jones & K. Harrow, Dreamtech Press
2. Programming in C – Stephen G. Kochan, III Edition, Pearson Eductaion
3. C and Data Structures:A Snap Shot Oriented Treatise Using Live Engineering Examples by Prof. N.B.Venkateswarlu and, Prof.E.V.Prasad, S Chand & Co. New Delhi
4. C/C++ for Engineers and Scientists, Harry H.Cheng ,McGrawHill.

T197 - ENGLISH - I

Lecture	**: 4 Periods/week**	**Internal Marks**	**: 25**
		External Marks	**: 75**
Credits	**: 3**	**External Examination**	**: 3 Hrs**

English Language continues to be regarded as an important tool for global communication and employability. Hence, it is imperative that students need to acquire communicative competence besides their core skills. The syllabus has been designed to develop linguistic and communicative competence of Engineering students with special emphasis on professional and functional aspects of English language i.e., on Listening, Speaking, Reading and Writing (LSRW Skills).

OBJECTIVES

- To improve the language proficiency of the students in English with emphasis on LSRW skills.
- To develop the study skills and Communication skills of the students in both formal and informal situations.
- To enable the students to face the academic and professional challenges of the present day scenario.
- To help students acquire the ability to speak effectively in English in the real life situations.
- To inculcate reading as a habit and to develop reading skills among students.
- To train students to improve their active and passive vocabulary.
- To familiarize the students with different rhetorical functions of Technical English.
- To enable the students write letters and reports effectively in formal and professional situations.

UNIT - I

Chapter – 1: "Read & Proceed" from Step by Step (*Pearson*)
Extensive Reading - Masterminds– The Trailblazers – **Jagadis Chandra Bose***(Orient Longman)*

UNIT - II

Chapter – 2: "Travel" from Step by Step (*Pearson*)
Extensive Reading - Masterminds– The World of Figures and Physics – **Chandra SekharaVenkata Raman** *(Orient Longman)*

UNIT - III

Chapter – 3: "Gender" from Step by Step (*Pearson*)
Extensive Reading - Masterminds–The Institution Builders– **Shanti SwarupBhatnagar** (*Orient Longman*)

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UNIT - IV

Vocabulary – Synonyms, Antonyms, Words often Confused, Gerunds & Infinitives, Prefixes & Suffixes, Word plurals, Analogy
Grammar – Parts of Speech, Sentence Completion, Question Tags, Tense and Aspect

UNIT - V

Analytical Writing – Sentence Construction – Types of sentences, Exercises with scrambled words & Jumbled sentences, Paragraph writing, Dialogue writing (Formal & Informal), Letter Writing (Formal & Informal), Resume writing, Expansion (of a given topic), Abstract Writing (Summarizing / Synopsis), Decision-making, Drafting E-Mails & Memo writing, Essay writing.

TEXT BOOKS

- Step by Step (*Pearson*)
- Masterminds by EnakshiChatterjee (*Orient Longman*)

REFERENCES

1. Andrea J Rutherford. *Basic Communication Skills for Technology*: Pearson Education, New Delhi, 2009.
2. Murphy. *English Grammar with CD*: Cambridge University Press, New Delhi, 2004
3. Rizvi, M Ashraf. *Effective Technical Communication*: Tata McGraw Hill, New Delhi, 2008.
4. Blum Rosen. *Word Power*: Cambridge University Press, New Delhi, 2009.

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T191 - ENGINEERING CHEMISTRY

Lecture	**: 3 Periods/week**	**Internal Marks**	**: 25**
		External Marks	**: 75**
Credits	**: 3**	**External Examination**	**: 3 Hrs**

UNIT - I

WATER TECHNOLOGY: Introduction, Hardness of Water - Temporary and Permanent hardness. Units and inter conversions of Units. Problems on Temporary and Permanent hardness. Boiler troubles – scale & sludge formation, Caustic embrittlement, Corrosion, priming & foaming, softening of water Methods of Treatment of Water for Domestic Purposes - Sedimentation, Coagulation, Filtration, Disinfection – Sterilization, Chlorination, Break point chlorination, Ozonization.
Water Treatment: Internal Treatment - Colloidal, Phosphate, Calgon, Carbonate, Sodium aluminates Conditioning of Water. External Treatment - Lime-Soda Process, Zeolite Process, Ion- Exchange Process.

UNIT - II

FUELS AND COMBUSTION: Definition and classification of Fuels- conventional fuels (solid, liquid, gaseous), Solid fuels- coal - analysis, Proximate and ultimate analyses of coal – significances, Liquid Fuels – primary- petroleum- refining of petroleum- cracking, knocking, synthetic petrol – Bergius and Fischer Tropsech's process; Gaseous fuels- octane number – cetane number,– water gas, producer gas CNG, and biogas - gross and net calorific values – (definition only) – flue gas analysis – Orsat's apparatus.

UNIT - III

CORROSION: Definition, Examples, Types of Corrosion: Theories of Corrosion and Mechanism - Dry Corrosion (Direct Chemical corrosion), Wet Corrosion (Electro Chemical corrosion) Principles of Corrosion, Galvanic Series, Galvanic Corrosion, Concentration Cell Corrosion, Mechanism of Wet and Chemical Corrosion - Hydrogen evolution type, Oxygen absorption type. Factors Influencing Corrosion. Control of Corrosion - Proper Design, Use of pure metal and metal alloys, Passivity, Cathodic Protection - Sacrificial anode and Impressed Current, Modifying the Environment and use of Inhibitors.

UNIT - IV

Polymer Science and Technology: Types of polymerization, Mechanism (Chain growth & step growth), Plastics –Thermosetting and Thermoplastic resins – preparation, properties and engineering applications of Polyethylene, PVC, Polystyrene, Teflon, Bakelite, Nylon, Conducting polymers: polyacetylene, polyaniline, conduction, doping, application. Characteristics and uses Rubber - Natural Rubber, Vulcanization and significance, Elastomers – Buna S, Buna N, Thiokol, Fibers- Polyester, fiber reinforced plastics (FRP), applications.

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UNIT - V

1. REFRACTORIES & INSULATORS: Definition, Classification with Examples, Criteria of a Good Refractory Material, Causes for the failure of a Refractory Material, Insulators – Definition and Classification with Examples. Characteristics of Insulating Materials, Thermal Insulators, Electrical Insulators - Their Characteristics and Engineering Applications.

2. LUBRICANTS: Introduction to Lubricants, Principles and function of lubricants - Types of Lubrication and Mechanism - Thick Film or Hydrodynamic Lubrication, Thin Film or Boundary Lubrication, Extreme Pressure Lubrication. Classification and properties of lubricants-Viscosity, flash and fire point, cloud and pour point, aniline point, Neutralization Number and mechanical strength, Selection of lubricants.

TEXT BOOKS

1. A text book of Engineering Chemistry by Jain & Jain, Dhanpat Rai Publishing Company, New Delhi (15th Edition) (2006).
2. A Text book of Engineering Chemistry by Dr. Y. Bharathi Kumari and Dr. Jyotsna Cherukuri, VGS Publications, First Edition, 2009.

REFERENCES

1. A Text book of Engineering Chemistry by Shashi Chawla, Dhanpat Rai Publishing Company, First Edition, 2002.
2. Advanced Engineering Chemistry by Dr. M. R. Senapati, University Science Press (Impart from Laxmi Publications), 3rd Edition 2009.
3. N. Krishnamurthy, P. Vallinayagam and D. Madhavan, Engineering Chemistry, 2nd Edition. PHI Learning PVT., LTD, New Delhi, 2008.
4. A Text book of Engineering Chemistry by S. S. Dara, S CHAND Publications.

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T195 - ENGINEERING PHYSICS

Lecture	**: 4 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**: 1 Period/Week**	**External Marks**	**: 75**
Credits	**: 4**	**External Examination**	**: 3 Hrs**

UNIT - I

INTERFERENCE: Superposition of waves-double slit interference- Young's double slit experiment- Coherence – Interference from thin films- Newton's rings.
DIFFRACTION: Diffraction and wave theory of light (Fresnel and Fraunhofer diffractions) - single slit Diffraction, Intensity in single- slit diffraction, Calculating the intensity– Double slit interference and diffraction combined.
GRATINGS AND SPECTRA - Multiple slits-width of the maxima, Diffraction gratings, Grating spectrum – Dispersion and Resolving power.
POLARIZATION: Polarization by reflection Brewster's law - Double refraction -Polarization by scattering - Retarders -Optical Activity.

UNIT - II

CRYSTAL STRUCTURES: Introduction –periodic arrays of atoms-Lattice translation vectors, Basis and crystal structure, Primitive cell, fundamental types of lattices-three dimension lattice types, Crystal systems- Structure and packing fractions of Simple cubic-Body centered cubic- Face centered cubic crystals.
X-RAY DIFFRACTION: Directions and planes in crystals – Miller indices – separation between successive (h k l) planes- Diffraction of X- rays by crystal planes – Braggs law-Laue method- powder method.

UNIT - III

LASERS: Introduction – Characteristics of Lasers- Principle of laser (Absorption, Spontaneous and stimulated emission of Radiation), Einstein Coefficients- Population Inversion - Helium Neon Laser, Semiconductor laser, Applications of Lasers.
FIBER OPTICS: Introduction- Principle of optical Fiber- Acceptance angle and Acceptance cone- Numerical aperture - refractive index profile-Application of optical fibers.

UNIT - IV

SUPER CONDUCTIVITY : Phenomenon, Meissner effect, critical parameters, Type I, Type II Super conductors, BCS theory of super conductivity, Applications of Super conductors.

UNIT - V

NON-DESTRUCTIVE TESTING USING ULTRASONICS: Characteristics Production and detection of ultrasonics-Piezoelectric and magnetostirictionmethods,Ultrasonic Testing - Basic Principle –Transducer – Couplant and inspection Standards – Inspection Methods – Pulse echo Testing Technique – Flaw detector- Different Types of Scans – Applications.

TEXT BOOKS

1. Fundamentals of physics Resinic, Halliday and Krane, John Wiley 2003
2. Engineering Physics by V RAJENDRAN TataMcGrahill

REFERENCES

1. Introduction to solid state physics, C. Kittel, John wiley, 1999.
2. Engineering physics by H K MALIK AK SINGH TATA McGRAHILL

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P806 – C - PROGRAMMING LAB

		Internal Marks	**: 25**
Lab/Practicals:	**3 Period/Week**	**External Marks**	**: 75**
Credits	**: 2**	**External Examination**	**: 3 Hrs**

I) Write a programme in 'C' language to cover the following problems.
a) Roots of Quadratic Equation.

b) Example program which shows the usage of various Operators available in C Language.

c) Example program which shows the usage of various preliminary Data types available in C Language.

d) Example programs to illustrate the *order of evaluation*.

II) WRITE EXAMPLE PROGRAMS:

a) To check whether the given year is leap year (or) not

b) Converting given two digit number into words using switch statement

c) To illustrate the usage of 'goto' statement.

d) Finding smallest& biggest number from the given set of 4 numbers using 'if' statement.

e) Calculate the student grade in the examination – assume suitable constraints.

f) Prepare electricity bill for the consumed units – assume suitable constraints.

III) EXAMPLE PROGRAMS:

a) To Display first N natural numbers
b) To find whether the given number is Armstrong (or) not
c) To find reverse of the given number and to check whether it is palindrome (or) not.
d) To find whether given number is strong number (or) not.
e) To check whether given number is Prime (or) not
f) To display prime numbers with in the given range(Nesting of Loops).
g) To display the following structure(Nesting of Loops)

i)
```
        1
    1   2   3
1   2   3   4   5
```

ii)
```
5   4   3   2
    4   3   2   1
    3   2   1
        2   1
        1
```

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IV) Write example programs in C Language:
a) To find factorial of a given number using functions.
b) Swap two numbers using functions.
c) To find GCD of two numbers using recursion
d) Write a recursive function to solve Towers of Honai problem.
e) Write an example program to illustrate use of external & static storage classes.

V) Write example programs in C Language to perform following operations:
a) Finding the sum and average of given numbers using Arrays.
b) To display elements of array in reverse order
c) To search whether the given element is in the array (or) not using linear search & binary search.
d) Write a C program to perform the following operations
i) Addition, subtraction and multiplication of Matrices
ii) Transpose of given matrix
(The above operations are to be exercised using functions also by passing arguments)
e) Write a C program to find whether the given string is palindrome (or) not.
f) To accept line of text and find the number of characters, number of vowels and number of blank spaces in it.
g) Write an example program to illustrate the use of any 5 string handling functions.

VI) a) Example program to bring clarity on pointer declaration & initialization and Pointer arithmetic.
b) Write an example program to describe the usage of *call by reference*.
c) Write a program to find sum of the elements of the array using functions.
d) Write an example program to illustrate the usage of command line arguments.
e) Program to illustrate the usage of dynamic memory management functions.

VII) a) Write an example program using structures to process the student record. Assume suitable fields for student structures (Different kinds of initialization of structure variables are to be exercised)
b) Write a program to read records of 10 employees and find their average salary (exercise array of structures & Nested structures concepts through this program).
c) Write a program to handle a structure variable using pointers and implement self referential structure(i.e. A structure variable having a pointer to itself)

VIII) Write an example program on file to perform following operations:
a) Accessing content from files and writing content in to it.
(Exercise different file operation modes)
b) Copy the contents of one file into another (Exercise different file operation modes)

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P830- ENGINEERING PHYSICS AND CHEMISTRY LAB

	Internal Marks	: 25
Lab/Practicals: 3 Period/Week	External Marks	: 75
Credits : 2	External Examination	: 3 Hrs

ENGINEERING PHYSICS LABORATORY
(Any 5 experiments)

LIST OF EXPERIMENTS

1. LCR Resonance circuit
2. Newton's Rings – Determination of Radius of curvature of plano convex lens
3. Verification of laws by using sonometer
4. Meldy's experiment
5. Wedge shaped film
6. Volume Resonator
7. Refractive index of light
8. Diffraction Grating – Normal incidence method
9. Rigidity modulus of a given wire
10. Frequency of AC supply – Sonometer

ENGINEERING CHEMISTRY LABORATORY
(Any 5 experiments)

1. Estimation of total Hardness of water by EDTA method
2. Determination of Temporary and permanent hardness of water.
3. Iodometric Titration of $K_2Cr_2O_7$ v/s $Na_2S_2O_3$ to determine the percentage purity of $K_2Cr_2O_7$ sample.
4. Preparation of Stanard Potassium Dichromate and Estimation of Copper by Iodometry.
5. Determine the amount of Oxalic acid and Sulphuric acid in 1 liter solution by using given standard Sodium Hydroxide and Potassium Permanganate solution
6. Determination of alkalinity of water sample.
7. Determination of Dissolved Oxygen (DO) content by Winkler's method.
8. Preparation of Urea formaldehyde resin.

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P831 - ENGINEERING WORKSHOP

		Internal Marks	**: 25**
Lab/Practicals	**: 3 Period/Week**	**External Marks**	**: 75**
Credits	**: 2**	**External Examination**	**: 3 Hrs**

TRADES FOR EXERCISES:

At least three exercise from each trade :

1. Carpentry
2. Fitting
3. House – Wiring
4. Plumbing

TRADES FOR EXERCISES : (MECHCHANICAL ENGINEERING)

At least two exercise from each trade :

1. Carpentry
2. Fitting
3. Tin - Smithy
4. Black - Smithy
5. House - Wiring
6. Plumbing

TEXT BOOK :

Workshop manual/P.Kannaiah / K.L. Narayana Scitech Publications, India Pvt Ltd, Chennai.

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T119 - APPLIED MATHEMATICS – II

Lecture	**: 4 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**: 1 Period/Week**	**External Marks**	**: 75**
Credits	**: 4**	**External Examination**	**: 3 Hrs**

UNIT - I

Laplace transforms of standard functions –Shifting Theorems, Transforms of derivatives and integrals – Unit step function –Dirac's delta function. Inverse Laplace transforms– Convolution theorem - Applications of Laplace transforms to ordinary differential equations

UNIT - II

Fourier Series: Determination of Fourier coefficients – Fourier series – even and odd functions – Fourier series in an arbitrary interval– Half-range sine and cosine series.

UNIT - III

Fourier integral theorem (only statement) – Fourier sine and cosine integrals – Fourier transform – sine and cosine transforms – properties – inverse transforms – Finite Fourier transforms.

UNIT - IV

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions –solutions of first order linear (Lagrange) equation. Method of Separation of Variables - Applications to wave equation one dimensional, heat equation and Laplace Equation.

UNIT - V

Z-transform – properties – Damping rule – Shifting rule – Initial and final value theorems - Inverse z-transform -Convolution theorem – Solution of difference equation by z-transforms.

TEXT BOOKS

1. Higher Engineering Mathematics by Dr. B.S. Grewal
2. Higher Engineering Mathematics by Dr. B. V. Ramana – TMGH

REFERNCES

1. Advanced Engineering Mathematics by Michael D. Greenberg – TMGH
2. Advanced Engineering Mathematics by Erwin Krezig - John Wiley & sons

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T198 - ENGLISH-II

Lecture	**: 4 Periods/week**	**Internal Marks**	**: 25**
		External Marks	**: 75**
Credits	**: 3**	**External Examination**	**: 3 Hrs**

English Language continues to be regarded as an important tool for global communication and employability. Hence, it is imperative that students need to acquire communicative competence besides their core skills. The syllabus has been designed to develop linguistic and communicative competence of Engineering students with special emphasis on professional and functional aspects of English language i.e., on Listening, Speaking, Reading and Writing (LSRW Skills).

OBJECTIVES

- To improve the language proficiency of the students in English with emphasis on LSRW skills.
- To develop the study skills and Communication skills of the students in both formal and informal situations.
- To enable the students to face the academic and professional challenges of the present day scenario.
- To help students acquire the ability to speak effectively in English in the real life situations.
- To inculcate reading as a habit and to develop reading skills among students.
- To train students to improve their active and passive vocabulary.
- To familiarize the students with different rhetorical functions of Technical English.
- To enable the students write letters and reports effectively in formal and professional situations.

UNIT - I

Chapter 4: "Disaster Management" from *Step by Step* (Pearson)
Extensive reading – *Masterminds* - The institution builders - **MeghanadSaha** *(*Orient Longman*)*

UNIT - II

Chapter 5: "Health" from *Step by Step* (Pearson)
Extensive reading – *Masterminds*- The New Age – **HomiJehangirBhabha** *(*Orient Longman*)*

UNIT - III

Chapter 6: "Sports" from *Step by Step* (Pearson)
Extensive reading – *Masterminds* - The New Age – **Vikram Sarabhai** *(*Orient Longman*)*

UNIT - IV

Grammar – Articles, Prepositions, Voice, Speech, Concord, Correction of Sentences
Vocabulary – Phrasal verbs, Gerunds, Infinitives, One word Substitutes.

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UNIT - V

Analytical writing – Comprehension, Technical dialogue writing,
Presentation skills - Note making, Information transfer / Data interpretation (Tables, Pie-charts, Bar graphs, Tree diagrams, Pictograms, etc.), Report writing

TEXTBOOK

Step by Step, Pearson Education, New Delhi 2010.
Master Minds, *(*Orient Longman*).*

REFERENCES

1. KoneruAruna. *Professional Communication:* Tata McGraw-Hill, New Delhi, 2007.
2. Effective Technical Communication, Rizvi, Tata McGraw-Hills, New Delhi, 2009.
3. Basic Communication Skills for Technology, Andrea J. Rutherford, Pearson Education.
4. GRE and TOEFL, Kaplan and Baron's, Latest editions.

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T264 - NUMERICAL METHODS

Lecture	**: 4 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**: 1 Period/Week**	**External Marks**	**: 75**
Credits	**: 4**	**External Examination**	**: 3 Hrs**

UNIT - I

Linear systems of equations: Rank-Echelon form, Normal form – Solution of Linear Systems – Direct Methods- Gauss Elimination - Gauss Jordon and Gauss Seidal Methods. Eigen values – Eigen Vectors – Properties – Cayley Hamilton Theorem – Inverse and Powers of a matrix by using Cayley Hamilton Theorem.

UNIT - II

Quadratic forms – Reduction to Canonical form – Rank and Nature of Quadratic form. Solution of Algebraic and Transcendental Equations: Introduction – The Method of False Position – Newton-Raphson Method.

UNIT - III

Interpolation: Introduction- Errors in Polynomial Interpolation – Finite differences- Forward Differences- Backward differences –Central differences – Symbolic relations and separation of symbols-Differences of a polynomial- Newton's formulae for interpolation – Lagrange's Interpolation formula.

UNIT - IV

Numerical Differentiation and Integration – Differentiation using finite differences – Trapezoidal rule – Simpson's 1/3 Rule –Simpson's 3/8 Rule.

UNIT - V

Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive Approximations-Euler's Method-Runge- Kutta Methods –Predictor-Corrector Methods- Milne's Method. Curve fitting: Fitting a straight line –Second degree curve-exponential curve by method of least squares.

TEXT BOOKS

1. Higher Engineering Mathematics by Dr. B.S. Grewal
2. Higher Engineering Mathematics by Dr. B. V. Ramana – TMGH

REFERENCES

1. Introductory Methods of Numerical Analysis by S. S. Sastry – PHI
2. Numerical Methods for Engineers with programming and software application by Steven .C. Chopra and Ra. P. Canale – TMGH
3. Numerical Methods for scientific and engineering by M. K. Jain, S. R. K. Iyengar – New Age International ltd.

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T136 – CLASSICAL MECHANICS

Lecture	**: 4 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**: 1 Period/Week**	**External Marks**	**: 75**
Credits	**: 4**	**External Examination**	**: 3 Hrs**

UNIT - I

BASICS & RESULTANT OF FORCE SYSTEMS

Introduction: Introduction to Engineering Mechanics – Units and Dimensions – Laws of Mechanics - Basic Concepts.

Systems of Forces: Coplanar Concurrent Forces – Resultant – Moment of Force and its Application – Couples - Varignon's theorem – Resolution of a Force in to a Force and a Couple - Resultant of Coplanar Force Systems

UNIT - II

EQUILIBRIUM OF SYSTEMS OF FORCES

Free body diagrams – Equations of Equilibrium of Coplanar Systems -Lami's Theorem – Reactions of Supports of Beams - Types of Supports – Types of Beams – Types of Loading - - Equilibrium of Rigid bodies in two dimensions –Examples.

UNIT - III

PROPERTIES OF SURFACES

Centroids: Introduction - Determination of Centroids by integration method - Rectangle, circle, triangle from integration – Theorems of Pappus –Guldinus - Centroids of composite plane figures (T section, I section, - Angle section, Hollow section by using standard formula).

Area Moments of Inertia: Second moments of plane area – Rectangle, triangle, circle from integration – T section, I section, Angle section, Hollow section by using standard formula – Radius of gyration - Parallel axis theorem and perpendicular axis theorem – Polar moment of inertia.

UNIT - IV

FRICTION

Introduction - Classification of friction - Laws of dry friction - Co-efficient of friction - Angle of friction - Angle of repose - Cone of friction - Wedge friction - Ladder friction - Problems involving the equilibrium of rigid bodies with frictional forces.

UNIT - V

DYNAMICS OF PARTICLES

Displacements, Velocity and acceleration, their relationship – Rectilinear motion – Newton's law – D'Alemberts Equation - Work Energy Equation of particles (Rectilinear Translation only) – Momentum and Impulse - Impact of elastic bodies (Direct Central impact only).

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TEXT BOOKS

1. Engineering Mechanics by S.S. Bhavikatti and K.G.Rajashekarappa – New Age International Publishers, New Delhi.
2. Engineering Mechanics by S.Timoshenko, D.H.Young and J.V.Rao – TATA McGraw Hill, New Delhi, Revised Fourth Edition.

REFERENCES

1. Engineering. Mechanics by RK Rajput – DhanpatRai and Sons, New Delhi
2. Engineering Mechanics by AK Tayal. Umesh Publications, New Delhi
3. Engineering Mechanics by Ferdinand . L. Singer / Harper – Collins
4. Engineering. Mechanics by RK Bansal – Lakshmi Publishers, New Delhi.

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T199 – ENVIRONMENTAL STUDIES

Lecture	**: 3 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**: 1**	**External Marks**	**: 75**
Credits	**: 3**	**External Examination**	**: 3 Hrs**

UNIT - I

Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance – Need for Public Awareness.

Natural Resources : Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems -Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources. Case studies. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles. **[11 Lectures]**

UNIT – II

Ecosystems : Concept of an ecosystem. - Structure and function of an ecosystem.- Producers, consumers and decomposers. - Energy flow in the ecosystem – Ecological succession. - Food chains, food webs and ecological pyramids.

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

[11 Lectures]

UNIT – III

Environmental Pollution: Definition, Types, Cause, effects and control measures of:

a. Air pollution
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear hazards

Solid waste Management: Causes, effects and control measures of urban and industrial wastes. - Role of an individual in prevention of pollution. - Pollution case studies. - Disaster management: floods, earthquake, cyclone and landslides. **[11 Lectures]**

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UNIT – IV

Social Issues and the Environment: From Unsustainable to Sustainable development -Urban problems related to energy -Water conservation, rain water harvesting, watershed management -Resettlement and rehabilitation of people; its problems and concerns. Case Studies -Environmental ethics: Issues and possible solutions. -Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies. -Wasteland reclamation. – Consumerism and waste products. **[11 Lectures]**

UNIT – V

Human Population and the Environment: Population growth, variation among nations. Population explosion – Family Welfare Programme -Environment and human health. -Human Rights. -Value Education. HIV/AIDS. -Women and Child Welfare. -Role of information Technology in Environment and human health. –Case Studies. Environment Protection Act. -Air (Prevention and Control of Pollution) Act. –Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act -Issues involved in enforcement of environmental legislation. -Public awareness. **[11 Lectures]**

TEXT BOOKS

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCES

Textbook of Environmental Sciences and Technology by M. Anji Reddy BS Publication.

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T135 – CIRCUIT THEORY

Lecture	**: 4 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**: 1 Period/Week**	**External Marks**	**: 75**
Credits	**: 4**	**External Examination**	**: 3 Hrs**

UNIT - I

DC Circuits: Basic components and electrical circuits, charge, current, voltage & power. Voltage and current sources, ohms law, current & voltage law & Kirchhoff's current & voltage law .The single node-pair circuit, series and parallel connected independent sources, resistor in series and parallel, voltage and current division, basic nodal and mesh analysis. Nodal and mesh analysis. Introduction to network topology, trees and nodal analysis. Links and loop analysis.

UNIT - II

A.C Circuits: R.M.S and Average values and form factor for different periodic wave forms, Steady state analysis of R, L and C (in series, parallel and series parallel combinations) with sinusoidal excitation – Concept of self and mutual inductances – co-efficient of coupling series circuit analysis with mutual inductance. Resonance – series, parallel circuits, concept of band width and Q factor. Three phase circuits: Phase sequence – Star and delta connection – Relation between line and phase voltages and currents in balanced systems – Calculations of active and reactive power.

UNIT - III

Network Theorems: Tellegens, Superposition, Reciprocity, Thevinin's, Norton's, Max Power Transfer theorem.Milliman's Theorem – Statement and proofs problem solving using dependent and independent sources for d.c and a.c excitation.

UNIT - IV

Transient Analysis : Transient response of R-L, R-C, R-L-C circuits (Series combinations only) for d.c. and sinusoidal excitations – Initial conditions - Solution using differential equation approach and Laplace transform methods of solutions.

UNIT - V

Two-port networks and Filters : Z,Y, ABCD, h-parameters – Conversion of one parameter to another parameter – condition for reciprocity and symmetry – 2 port network connections in series, parallel and cascaded – problem solving. L.P, H.P, B.P, B.E, Prototype filters design – M-derived filters of L.P. and H.P.- Composite filter design of L.P. and H.P design of various symmetrical attenuators.

TEXT BOOK

Network Analysis – ME Van Valkenburg, Prentice Hall of India, 3rd Edition, 2000.

REFERENCES

1. Engineering Circuit Analysis – William Hayt and Jack E Kemmerly, McGraw Hill, 5th Edition, 1993.
2. Network Analysis – N.C.Jagan and C.Lakshminarayana, B.S. Publications, 2006.
3. Electric Circuits – J.Edminister and M.Nahvi – Schaum's Outlines, TMH, 1999.
4. Networks, Lines and Fields - JD Ryder, PHI, 2nd Edition, 1999.

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P829 - ENGINEERING DRAWING THROUGH AUTOCAD LAB.

		Internal Marks	**: 25**
Lab/Practicals	**: 3 Period/Week**	**External Marks**	**: 75**
Credits	**: 2**	**External Examination**	**: 3 Hrs**

UNIT - I

Introduction to Engineering Drawing and its importance -Introduction to Computer Aided Drafting, Auto CAD commands, Setup Commands, Drawing Commands, Editing Commands, Dimensioning Commands -Theory of Projection – Elements of projection, planes of projection, and methods of projection.
Orthographic Projection - Lines used in general engineering drawing, types of surfaces, invisible lines, precedence of lines, selection of views, principles of multi view drawing, steps to draw orthographic views, orthographic projection of different objects.

UNIT - II

Isometric Drawing- Theory of isometric projection-Isometric view and Isometric projection Isometric projection from Orthographic views for simple objects.

UNIT - III

Projections of points - Projection of straight Lines –Various positions of straight lines w.r.t reference planes, inclined to both planes.

UNIT - IV

Projections of Planes –Introduction, Planes parallel to reference planes, inclined to one reference plane and perpendicular to other, planes perpendicular to both reference planes, planes inclined to both reference planes.

UNIT - V

Projections of Solids –Types of solids, Polyhedra, solids of revolution, Projection of solids in simple position, projection of solids with axis inclined to one reference plane and parallel to other.

TEXT BOOKS

1. Engineering Graphics with AutoCAD by Bethune PHI Learning Private Limited, New Delhi, 2009.
2. Engineering Graphics with AutoCAD by M. Kulkami, A.P Rastogi, and A.K. Sarkar;PHI Learning Private Limited, New Delhi, 2009
3. Engineering Drawing by N.D. Bhatt, Charitor publications.

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P832 - ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

		Internal Marks	**: 25**
Lab/ Practicals	**: 3 Period/Week**	**External Marks**	**: 75**
Credits	**: 2**	**External Examination**	**: 3 Hrs**

The English Language Communications Skills Lab focuses on practice of sounds of language and familiarizes the students with the use of English in everyday situations and contexts. It aims at improving the communicative competence of students and to enrich their power of expression, articulation and persuasiveness. The thrust is on developing competences, both linguistic as well as communicative, in order to improve employability potential.

OBJECTIVES

1. To expose the students to a variety of self-instructional, learner-friendly modes of English language learningand stimulate intellectual and attitudinal exercise.

2. To provide students with the required facility and practice to face computer-based competitive exams such GRE, TOEFL, IELTS etc.

3. To enable them to learn better pronunciation through emphasis on word accent, intonation, and rhythm.

4. To train them to use language effectively to face interviews, group discussions, publicspeaking.

5. To develop necessary attitudes and behaviors so as to improve their employability quotient.

SYLLABUS

The following course content is prescribed for the English Language Communication Skills Laboratory sessions:

1. Dimensions of Phonetics: Phonetic Transcription, Sounds, Stress, Intonation, Rhythm, Varieties of Spoken English: Indian, British and American
2. Oral Presentations -- Prepared and Extempore -- JAM
3. Role Play
4. Describing Objects / Situations / People
5. Information Transfer
6. Debates
7. Group Discussions

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SUGGESTED SOFTWARE/BOOKS:

* *Digital Mentor*, Globarena,Hyderabad,2005
* *Sky Pronunciation Suite: Young India Films, Chennai, 2009*
* Mastering English in Vocabulary, Grammar, Spelling, Composition, Dorling Kindersley,USA, 2001
* Dorling Kindersley Series of Grammar, Punctuation, Composition, Dorling Kindersley,USA, 2001
* *Oxford Talking Dictionary,*The Learning Company, USA, 2002
* *Cambridge Advanced Learners English Dictionary* (with CD). Cambridge University Press, New Delhi, 2008.
* Learning to Speak English - 4 CDs. The Learning Company,USA,2002
* Herbert Puchta and Jeff Stranks with Meredith Levy: *English in Mind*: Cambridge University Press, New Delhi, 2009.
* Krishna Mohan, Effective English Communication,Tata McGraw Hills,New Delhi,2007

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T188 – ELECTRONIC DEVICES AND CIRCUITS

Lecture	**: 4 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**: 1 Period/Week**	**External Marks**	**: 75**
Credits	**: 5**	**External Examination**	**: 3 Hrs**

UNIT - I

JUNCTION DIODE CHARACTERISTICS : Review of semi conductor Physics – n and p –type semi conductors, Mass Action Law, Continuity Equation, Hall Effect, Fermi level of semiconductors, Energy band diagram of PN diode, PN diode-biasing, The current components, Diode equation, V-I characteristics, Temperature dependence of VI characteristic, Transition and Diffusion capacitances, Breakdown Mechanisms in p-n Diode, Zener diode, Tunnel Diode, Varactar Diode, LED, LCD. And photo diode

UNIT - II

RECTIFIERS AND FILTERS : Half wave rectifier, ripple factor, full wave rectifier, Harmonic components in a rectifier circuit, Inductor filter, Capacitor filter, L- ?section filter, Π- section filter, Multiple L- section and Multiple Πsection filter, and comparison of various filter circuits? in terms of ripple factors, basics of regulators.

UNIT - III

TRANSISTOR and FET CHARACTERISTICS : Junction transistor, Transistor current components, Transistor as an amplifier, Transistor construction, Current components in a transistor, Input and Output characteristics of transistor in Common Base, Common Emitter, and Common collector configurations, Relation between Alpha,Beta and gama, FET- JFET characteristics, Small signal model of JFET, MOSFET characteristics (Enhancement and depletion mode), Comparison of Transistors, Introduction to SCR and UJT.

UNIT - IV

BIASING AND STABILISATION : BJT biasing, DC equivalent model, criteria for fixing operating point, Fixed bias, Collector to base bias, Self bias techniques for stabilization, Stabilization factors, (S, S', S''), Compensation techniques, (Compensation against variation in V_{BE}, I_{co},) Thermal run away, Thermal stability.

UNIT - V

AMPLIFIERS: Small signal low frequency transistor amplifier circuits: h-parameter representation of a transistor, Analysis of single stage transistor amplifier using h-parameters: voltage gain, current gain, Input impedance and Output impedance. Comparison of transistor configurations in terms of A_I , R_i , A_v , R_o, Introduction to feedback Amplifier and Oscillators.

TEXT BOOK

Electronic Devices and Circuits – J.Millman, C.C.Halkias, and Satyabratha Jit Tata McGraw Hill, 2nd Ed., 2007.

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REFERENCES

1. Electronic Devices and Circuits – R.L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall,9th Edition,2006.
2. Electronic Devices and Circuits – S Salivahanan, N.Suresh Kumar and A Vallavaraj, McGraw Hill, 5th edition, 2010.
3. Electronic Devices and Circuits – T.F. Bogart Jr., J.S.Beasley and G.Rico, Pearson Education, 6th edition, 2004.
4. Principles of Electronic Circuits – S.G.Burns and P.R.Bond, Galgotia Publications, 2nd Edn.., 1998.
5. Microelectronics – Millman and Grabel, Tata McGraw Hill, 1988.
6. Electronic Devices and Circuits – Dr. K. Lal Kishore, B.S. Publications, 2nd Edition, 2005.
7. Electronic Devices and Circuits- Prof GS N Raju I K International Publishing House Pvt. Ltd 2006.

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T186 – ELECTROMAGNETIC FIELDS

Lecture	**: 4 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**: 1 Period/Week**	**External Marks**	**: 75**
Credits	**: 4**	**External Examination**	**: 3 Hrs**

OBJECTIVE

The objective of this course is to introduce the concepts of electric field and magnetic fields and their applications which will be utilized in the development of the theory for power transmission lines and electrical machines.

UNIT - I

Electrostatics

Electrostatic Fields – Coulomb's Law – Electric Field Intensity (EFI) – EFI due to a line and a surface charge – Work done in moving a point charge in an electrostatic field – Electric Potential – Properties of potential function – Potential gradient – Gauss's law – Application of Gauss's Law – Maxwell's first law, div(D) =ρv

UNIT - II

Conductors and Dipole

Laplace's and Poison's equations – Solution of Laplace's equation in one variable. Electric dipole – Dipole moment – potential and EFI due to an electric dipole – Torque on an Electric dipole in an electric field – Behavior of conductors in an electric field – Conductors and Insulators. Electric field inside a dielectric material – polarization – Dielectric – Conductor and Dielectric – Dielectric boundary conditions, Capacitance – Capacitance of parallel plate and spherical and co-axial capacitors with composite dielectrics – Energy stored and energy density in a static electric field – Current density – conduction and Convection current densities – Ohm's law in point form – Equation of continuity

UNIT - III

Magneto Statics

Static magnetic fields – Biot-Savart's law – Oesterd's experiment - Magnetic field intensity (MFI) – MFI due to a straight current carrying filament – MFI due to circular, square and solenoid current – Carrying wire – Relation between magnetic flux, magnetic flux density and MFI – Maxwell's second Equation, div(B)=0.

Ampere's circuital law and its applications viz. MFI due to an infinite sheet of current and a long current carrying filament – Point form of Ampere's circuital law – Curl (H)=Jc, Field due to a circular loop, rectangular and square loops.

UNIT - IV

Force in Magnetic fields

Magnetic force - Moving charges in a Magnetic field – Lorentz force equation – force on a current element in a magnetic field – Force on a straight and a long current carrying conductor in a magnetic field – Force between two straight long and parallel current carrying conductors – Magnetic dipole and dipole moment – a differential current loop as a magnetic dipole – Torque on a current loop placed in a magnetic field. Scalar Magnetic potential and its limitations – vector magnetic potential and its properties – vector magnetic potential due to simple configurations – vector Poisson's equations.

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UNIT - V

Time Varying Fields

Time varying fields – Faraday's laws of electromagnetic induction – Its integral and point forms –Maxwell's fourth equation, Curl (E)=-□B/□t– Statically and Dynamically induced EMFs – Simple problems - Modification of Maxwell's equations for time varying fields – Displacement current – Pointing Theorem and Pointing vector.

TEXT BOOK

"Engineering Electromagnetics" by William H. Hayt & John. A. Buck Mc. Graw-Hill Companies, 7th Editon.2006.

REFERENCES

1. "Introduction to Electro Dynamics" by D J Griffiths, Prentice-Hall of India Pvt.Ltd, 2nd editon
2. "Electromagnetics" by J P Tewari.
3. "Electromagnetics" by J. D Kraus Mc Graw-Hill Inc. 4th edition 1992.
4. "Electro magnetic Fields" by Sadiku, Oxford Publications

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T320 – SWITCHING THEORY AND DIGITAL LOGIC

Lecture	**: 4 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**: 1**	**External Marks**	**: 75**
Credits	**: 4**	**External Examination**	**: 3 Hrs**

UNIT - I

NUMBER SYSTEMS & BOOLEAN ALGEBRA : Philosophy of number systems – complement representation of negative numbers-binary arithmetic-binary codes-error detecting & error correcting codes – hamming codes.
Fundamental postulates of Boolean Algebra - Basic theorems and properties - switching functions–Canonical and Standard forms-Algebraic simplification of digital logic gates, properties of universal gates-Multilevel NAND/NOR realizations.

UNIT - II

MINIMIZATION OF SWITCHING FUNCTIONS:
Map method, Prime implicants, Don't care combinations, Minimal SOP and POS forms, Tabulation Method, Prime –Implicant chart, simplification rules.

UNIT - III

COMBINATIONAL LOGIC DESIGN: Design using conventional logic gates, Encoder, Decoder, Multiplexer, De-Multiplexer, Modular design using IC chips MSI & LSI: MUX Realization of switching functions, Parity bit generator, Code-converters.
PROGRAMMABLE LOGIC DEVICES Basic PLD's-ROM, PROM, PLA, PLD. Realization of Switching functions using PLD's.

UNIT - IV

SEQUENTIAL CIRCUITS: Classification of sequential circuits (Synchronous, Asynchronous, Pulse mode, Level mode with examples) Basic flip-flops-Triggering and excitation tables. Steps in synchronous sequential circuit design. Design of modulo-N Ring & Shift counters, Serial binary adder, sequence detector.
Finite state machine-capabilities and limitations, Mealy and Moore models-minimization of completely specified and incompletely specified sequential machines, Partition techniques and Merger chart methods-concept of minimal cover table.

UNIT - V

ALGOROTHIMIC STATE MACHINES: Salient features of the ASM chart-Simple examples-System design using data path and control subsystems-control implementations-examples.

TEXT BOOKS

Digital Design – Morris Mano, PHI, 3rd Edition, 2006.

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REFERENCES

1. Digital Design, J F Wakerly, Prentice Hall 2000
2. Digital Electronics, 3rd Edition, RP Jain, Modern TMH, 2000
3. Switching & Finite Automata theory – Zvi Kohavi, TMH,2nd Edition.
4. An Engineering Approach To Digital Design – Fletcher, PHI.
5. Digital Integrated Electronics, Taub and Schilling, Mc-Graw Hill, 1977.
6. Fundamentals of Logic Design – Charles H. Roth, Thomson Publications, 5th Edition, 2004.
7. Digital Logic Applications and Design – John M. Yarbrough, Thomson Publications, 2006.

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T245 – MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Lecture	**: 4 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**:**	**External Marks**	**: 75**
Credits	**: 3**	**External Examination**	**: 3 Hrs**

UNIT - I

Introduction to Managerial Economics: Definition, Nature and Scope of Managerial Economics–Demand Analysis: Demand Determinants, Law of Demand and its exceptions, Types of demand. Definition, Types Measurement and Significance & types of Elasticity of Demand. Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting (survey methods, statistical methods, expert opinion method, test marketing, controlled experiments, judgmental approach to demand forecasting)

UNIT - II

Theory of Production and Cost Analysis: Production Function – Isoquants and Iso-costs, MRTS, Least Cost Combination of Inputs. Laws of Returns, Internal and External Economies of Scale. **Cost Analysis:** Cost concepts, Opportunity cost, Fixed vs. Variable costs, Explicit costs Vs. Implicit costs, Out of pocket costs vs. Imputed costs, accounting cost Vs economic cost , Past cost Vs future cost. Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems)- Managerial Significance and limitations of BEA.

UNIT - III

Introduction to Markets & Pricing Policies:
Market structures: Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly. **Objectives and Policies of Pricing- Methods of Pricing:** Cost Plus Pricing, Marginal Cost Pricing, Sealed Bid Pricing, Going Rate Pricing, Limit Pricing, Market Skimming Pricing, Penetration Pricing, Two-Part Pricing, Block Pricing, Bundling Pricing, Peak Load Pricing, Cross Subsidization. **Business Organizations:** Characteristic features of Business, Features of merits & demerits of Sole Proprietorship, Partnership, Joint Stock Company and Public Enterprises.

UNIT - IV

Capital and Capital Budgeting: Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Components of working capital & Factors determining the need of working capital. Methods and sources of raising finance.Nature and scope of capital budgeting, features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method (simple problems)

UNIT - V

Introduction to Financial Accounting: Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts with simple adjustments. **Financial Analysis through ratios:** Ratios, Importance, types (Current Ratio and quick ratio), Activity Ratios (Inventory turnover ratio and Debtor Turnover ratio), Capital structure Ratios (Debt- Equity ratio, Interest Coverage ratio), and Profitability ratios (Gross Profit Ratio, Net Profit ratio, Operating Ratio, P/E Ratio and EPS).

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TEXT BOOK

Aryasri: Managerial Economics and Financial Analysis, 2/e, TMH, 2005.

REFERENCES

1. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2003.
2. Ambrish Gupta,Financial Accounting for Management, Pearson Education, New Delhi.
3. Lipey &Chrystel, Economics, Oxford university Press.
4. Domnick Salvatore: Managerial Economics in a Global Economy,4th Edition,Thomson.

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T294 – PULSE AND DIGITAL CIRCUITS

Lecture	: 4 Periods/week	Internal Marks	: 25
Tutorial	: 1	External Marks	: 75
Credits	: 4	External Examination	: 3 Hrs

OBJECTIVE

The course has been designed to give an overall view of I/O signals,RC networks as integrator,differentiator and attenuators.The students get familiarized with diode,clippers and transistors and their characteristics.The students will be able to analyse and design multivibrators.They also get familiarized with time based generators and sampling gates.

UNIT - I

LINEAR WAVESHAPING

High pass, low pass RC circuits, their response for sinusoidal, step, pulse, square and ramp inputs. RC network as differentiator and integrator, attenuators, its applications in CRO probe, RL and RLC circuits and their response for step input, Ringing circuit.

UNIT - II

NON-LINEAR WAVE SHAPING

Diode clippers, Transistor clippers, clipping at two independent levels, Transfer characteristics of clippers, Emitter coupled clipper, Comparators, applications of voltage comparators, clamping operation, clamping circuits using diode with different inputs, Clamping circuit theorem, practical clamping circuits, effect ofdiode characteristics on clamping voltage, Transfer characteristics of clampers.

UNIT - III

SWITCHING CHARACTERISTICS OF DEVICES

Diode as a switch, piecewise linear diode characteristics, Transistor as a switch, Break down voltage consideration of transistor, saturation parameters of Transistor and their variation with temperature, Design of transistor switch, transistor-switching times.

MULTIVIBRATORS Analysis and Design of Bistable, Monostable, Astable Multivibrators and Schmitt trigger using transistors.

UNIT - IV

TIME BASE GENERATORS

General features of a time base signal, methods of generating time base waveform, Miller and Bootstrap time base generators – basic principles, Transistor miller time base generator, Transistor Bootstrap time base generator, Current time base generators.

SYNCHRONIZATION AND FREQUENCY DIVISION Principles of Synchronization, Frequency division in sweep circuit, Astable relaxation circuits, Monostable relaxation circuits, Synchronization of a sweep circuit with symmetrical signals, Sine wave frequency division with a sweep circuit.

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UNIT - V

SAMPLING GATES

Basic operating principles of sampling gates, Unidirectional and Bi-directional sampling gates, Reduction of pedestal in gate circuits, Applications of sampling gates. Realization of logic gates using diodes & transistors: AND, OR gates using Diodes, Resistor, Transistor Logic, Diode Transistor Logic.

TEXT BOOKS

1. Pulse, Digital and Switching Waveforms J. Millman and H. Taub, McGraw-Hill, 1991.
2. Solid State Pulse circuits - David A. Bell, PHI, 4th Edn.., 2002 .

REFERENCES

1. Pulse and Digital Circuits – A. Anand Kumar, PHI.
2. Wave Generation and Shaping L. Strauss.
3. Pulse, Digital Circuits and Computer Fundamentals - R.Venkataraman.

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T206 – FLUID MECHANICS AND THERMAL ENGINEERING

Lecture	**: 4 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**: 1**	**External Marks**	**: 75**
Credits	**: 4**	**External Examination**	**: 3 Hrs**

UNIT - I

Fluid Mechanics: Introduction- Properties of Fluids-Pressure, Density, Specific Weight, Specific Gravity, Viscosity-Types of Fluids-Types of Fluid Flows-Continuity, Momentum and Bernoullis Equation - Flow Through Pipes-Friction Losses in Pipes-Darcys Weisbach Equation-Reynolds Number and its significance (10)

UNIT - II

Pressure Measurement: Total and Static Pressure measurements using Pitot Tube, Pitot-Static Tube, Manometers, Mechanical Gauges
Velocity Measurement: Anemometers-Cup and Vane Types, Hot-wire Anemometer
Flow Measurements: Introduction, Orifice meter, Venturi meter, Rotameter and Elbow meter (10).

UNIT - III

Basic Thermodynamics: Fundamental Concepts -Thermodynamic System- -Zeroth Law – Work done in Constant Pressure, Constant Volume, Constant Temperature and Reversible Adiabatic, Polytropic Process.
First Law of Thermodynamics: Statement-Internal Energy-Enthalpy-Specific Heats – Steady Flow Energy Equation.
Second Law of Thermodynamics: Kelvin-Plank and Clasius Statements, Reversible Process-Carnot Cycle- Entropy. (10)

UNIT - IV

Gas Power Cycles: Introduction, Analysis of Power Cycles- Carnot, Otto, Diesel, Dual, and Brayton
Internal Combustion Engines: Classification-Working of Spark Ignition and Compression Ignition Engines-2 Stroke & 4 Stroke Engines (10)

UNIT - V

Vapor Power Cycles- Analysis of Carnot Vapor Cycle, Simple Rankine Cycle, Refrigeration Cycles–**Introduction, Refrigerator, Heat Pump, COP, Reveresd Carnot Cycle, Bell-Coleman Cycle, Vapor Compression Cycle** (10)

TEXT BOOKS

1. Hydraulics, Fluid mechanics and Hydraulic machinery MODI and SETH.
2. Fundamentals of Engineering Thermodynamics- Second Edition, E. Rathakrishnan-PHI

REFERENCES

1. Fluid Mechanics, White F.M. TMH
2. Fluid Mechanics-E. Rathakrishnan- PHI, 2007
3. Engineering Thermodynamics—Cengel & Boles, TMH
4. Engineering Thermodynamics -- P.K.Nag, TMH

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LBRCE EXAMINATION SECTION

P827 – ELECTRONIC DEVICES AND CIRCUITS USING LAB.VIEW

		Internal Marks	**: 25**
Lab/ Practicals : 3 Period/Week		**External Marks**	**: 75**
Credits	**: 2**	**External Examination**	**: 3 Hrs**

Cycle 1

(Hardware Experiments minimum 5 experiments should be conducted)

1. Identification, Specifications, Testing of R,LC Components (Colour Codes), and basic Electronic Instruments.
2. PN junction diode characteristics
3. Zener diode characteristics
4. Full wave Rectifier without & with filters
5. Transistor CB characteristics
6. Transistor CE characteristics
7. FET characteristics

Cycle 2

(Labview based Experiments minimum 5 experiments should be conducted)

8. Resister colour coding
9. Series & parallel resistors
10. PN junction diode characteristics
11. Zener diode characteristics
12. Full wave Rectifier without & with filters
13. CE Amplifier
14. CC Amplifier
15. FET Amplifier

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P869 – PULSE AND DIGITAL CIRCUITS LAB.

Lecture	**: 3 Periods/week**	**Internal Marks**	**: 25**
		External Marks	**: 75**
Credits	**: 2**	**External Examination**	**: 3 Hrs**

LIST OF EXPERIMENTS :

1. Linear Wave shaping.
2. Non Linear Wave shaping – Clipper.
3. Non Linear Wave shaping – Clamper.
4. Transistor as a switch.
5. Study of logic gates & some applications.
6. Study of Flip-Flop & some applications.
7. Astable Multivibrator.
8. Mono stable Multivibrator.
9. Bistable Multivibrator.
10. Schmitt Trigger.
11. UJT as a Relaxation oscillator.
12. Bootstrap sweep circuit.

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T187 – ELECTRONIC CIRCUITS

Lecture	**: 4 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**: 1 Period/Week**	**External Marks**	**: 75**
Credits	**: 4**	**External Examination**	**: 3 Hrs**

UNIT - I

SMALL SIGNAL AMPLIFIERS : Common emitter amplifier with emitter resistance, Emitter follower, FET small signal model, Low frequency common source and common drain amplifiers, FET as Voltage Variable Resistor, Cascading Transistor Amplifiers, High input Resistance Transistor Circuits – Darlington pair, Cascode amplifier, Frequency response and analysis of RC Coupling, Direct coupling and Transformer coupling, Difference amplifier, Two Stage RC Coupled JFET amplifiers (in Common Source (CS) configuration). Transistor at High Frequencies, Hybrid- π Common Emitter transistor model, Hybrid- π conductances, Hybrid π capacitances, Validity of hybrid π model, Variation of Hybrid Parameters, CE short circuit gain, Current gain with resistive load, Single stage CE transistor amplifier response, Gain Bandwidth product, Emitter follower at High frequencies.

UNIT - II

LARGE SIGNAL AMPLIFIERS : Classification of amplifiers, Class A large signal amplifiers, second harmonic distortion, higher order harmonic distortion, transformer-coupled class A audio power amplifier – efficiency of Class A amplifiers. Class B amplifier – efficiency - push-pull amplifier - distortion in amplifiers - complementary-symmetry (Class B) push-pull amplifier, Class C,Class D amplifier – Class S amplifier – MOSFET power amplifier, Thermal stability and heat sink.

UNIT - III

FEEDBACK AMPLIFIERS: Block diagram, Loop gain, Gain with feedback, Effects of negative feedback – Sensitivity and desensitivity of gain, Cut-off frequencies, distortion, noise, input impedance and output impedance with feedback, Four types of negative feedback connections – voltage series feedback, voltage shunt feedback, current series feedback and current shunt feedback, Method of identifying feedback topology and feedback factor, Nyquist criterion for stability of feedback amplifiers.

UNIT - IV

OSCILLATORS : Classification, Barkhausen Criterion - Mechanism for start of oscillation and stabilization of amplitude, General form of an Oscillator, Analysis of LC oscillators - Hartley, Colpitts, Clapp, Franklin, Armstrong, Tuned collector oscillators, RC oscillators - phase shift – Wienbridge - Twin-T Oscillators, Frequency range of RC and LC Oscillators, Quartz Crystal Construction, Electrical equivalent circuit of Crystal, Miller and Pierce Crystal oscillators, frequency stability of oscillators.

UNIT - V

TUNED AMPLIFIERS AND VOLTAGE REGULATORS: Introduction, Q-Factor, Small Signal Tuned Amplifier – Capacitance single tuned amplifier, Double Tuned Amplifiers, Effect of Cascading Single tuned amplifiers on Band width, Effect of Cascading Double tuned amplifiers on Band width, Staggered tuned amplifiers, Stability of tuned amplifiers, Voltage regulation – Line Regulation, Load Regulation, Types of Regulators, Series voltage regulator , shunt regulators, Overload Voltage protection.

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TEXT BOOK

Millman J and Halkias .C., Integrated Electronics, TMH, 2007.

REFERENCES

1. Robert L. Boylestad and Louis Nashelsky, Electronic Devices and Circuit Theory, 9th Edition, Pearson Education / PHI, 2007.
2. Sedra / Smith, Micro Electronic Circuits Oxford University Press, 2004.
3. S. Salivahanan, N. Suresh Kumar and A. Vallavaraj, Electronic Devices and Circuits, 2nd Edition, TMH, 2007.

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T133 – CALIBRATION AND ELECTRONICS MEASUREMENTS

Lecture	**: 4 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**: 1**	**External Marks**	**: 75**
Credits	**: 4**	**External Examination**	**: 3 Hrs**

UNIT - I

Introduction to measurements - Physical measurement - Forms and methods of measurements – measurement Errors - Statistical analysis of measurement data - Probability of errors - Limiting errors.

UNIT - II

Standards - Definition of standard units - International standards - Primary standards - Secondary standards - Working standards - Voltage standard - Resistance standard - Current standard - Capacitance standard – Time and frequency standards.

UNIT - III

Testing and calibration – Traceability - Measurement reliability - Calibration experiment and evaluation of results - Primary calibration - Secondary calibration - Direct calibration - Indirect calibration - Routine calibration - Calibration of a voltmeter, ammeter and oscilloscope.

UNIT - IV

Voltage and current measurements: DC & AC voltage measurements using Rectifier, Thermocouple & Electronic voltmeters, Ohm meter, Digital Voltmeters, Range Extension of Ammeters & Voltmeter. Bridges: AC Bridges – measurement of inductance, Maxwell's bridge, Anderson bridge, measurement of capacitance, Schering bridge, measurement of impedance – Kelvin's bridge, Wheat Stone bridge, HF bridges, problems of shielding, and grounding, Q-meter.

UNIT - V

Oscilloscopes: CRO operation, CRT characteristics, probes, Time base sweep modes, Trigger generator, Vertical amplifier, modes of operation, A, B, alternate & chop modes, sampling oscilloscopes, storage oscilloscope, Standard specifications of CRO, Synchronous selector circuits, Spectrum analyzers, Different types of spectrum analyzer, Recorders, Introduction to magnetic recording techniques & X-Y plotters.

TEXT BOOK

Electronic Instrumentation – HS Kalsi, Tata McGraw Hill, 2004.

REFERENCES

1. Principles of measurement and instrumentation – S.Morris, 2nd edition, Prentice-Hall of India,2004.
2. John P. Bentley: Principles of measurement systems, 3rd edition, Addison Wesley Longman, 2000.
3. Measuring Systems, Application and Design – by E.O. Doebelin, McGraw Hill.
4. Electrical and Electronic Measurements – by Shawney, Khanna Publ.
5. Electronic Instrumentation and measurements–by David A.Bell, 2nd Edition,PHI,2003.
6. M.M.S.Anand: Electronic instruments and instrumentation Technology, Prentice-Hall of India,2004.

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T220 – INDUSTRIAL INSTRUMENTATION

Lecture	**: 4 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**: 1**	**External Marks**	**: 75**
Credits	**: 5**	**External Examination**	**: 3 Hrs**

UNIT - I

METROLOGY : Measurement of length – Plainness – Area – Diameter – Roughness – Angle – Comparators – Gauge blocks –Optical Methods of length and distance measurements.

UNIT - II

VELOCITY AND ACCELERATION MEASUREMENT: Relative velocity – Translational and Rotational velocity measurement – Revolution counters and Timers - Magnetic and Photoelectric pulse counting stroboscopic methods - Accelerometers of different types - Gyroscopes.

UNIT - III

FORCE AND TORQUE MEASUREMENT: Force measurement – Different methods – Torque measurement – Dynamometers- Gyroscopic Force and Torque Measurement – Vibrating wire Force transducer

UNIT - IV

PRESSURE MEASUREMENT: Basics of Pressure measurement – Deadweight Gages and Manometers types – Force-Balance and Vibrating Cylinder Transducers – High and Low Pressure measurement – McLeod Gage, Knudsen Gage, Momentum Transfer Gages, Thermal Conductivity Gages, Ionization Gazes, Dual Gage Techniques.

UNIT - V

FLOW MEASUREMENT: Head type, Area type (Rota meter), electromagnetic type, Positive displacement type, mass flow meter, ultrasonic type ,vertex shedding type, Hotwire anemometer type.Laser Doppler Veloci-meter.

TEST BOOK

Measurement Systems – Applications &Design : By Doeblin E.O.- IV edition, MCGraw Hill International, 1990.

REFERENCES

1. Principles of Industrial Instrumentation – D. Patranabis – TMH Edn: 1997
2 Process Instruments & Control Hand book: By Considine D.M. - IV Edition-MCGrawHill International, 1993.
3. Mechanical & Industrial Measurements: By R.K.Jain, Khanna Publishers -1986.
4. Instrument Technology –Vol. –I : By Jones E.B.

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T184 – ELECTRICAL TECHNOLOGY

Lecture	**: 4 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**: 1 Period/Week**	**External Marks**	**: 75**
Credits	**: 4**	**External Examination**	**: 3 Hrs**

OBJECTIVE

This course introduces the concepts of various AC & DC machines and basic Instruments in Electrical Engineering discipline. The emphasis of this course is laid on the machines which include D.C.Machines, Transformers, three phase Induction motors, Alternators and Electrical Instruments.

UNIT - I

DC MACHINES: Principle of operation of DC Machines- EMF equation – Types of generators – Magnetization and load characteristics of DC generators
D.C. MOTORS : DC Motors – Types of DC Motors – Characteristics of DC motors – Losses and efficiency – Swinburne's test – Speed control of DC shunt motor – Flux and Armature voltage control methods.

UNIT - II

TRANSFORMERS: Principle of operation of single phase transformer – types – Constructional features Phasor diagram on No Load and Load – Equivalent circuit
Performance of transformers: Losses and Efficiency of transformer and Regulation – OC and SC tests – Predetermination of efficiency and regulation (Simple Problems).

UNIT - III

THREE PHASE INDUCTION MOTOR: Principle of operation of three-phase induction motors –Slip ring and Squirrel cage motors – Slip-Torque characteristics – Efficiency calculation – Starting methods.
Single phase induction motors: Principle of operation - Shaded pole motors – Capacitor motors,

UNIT - IV

ALTERNATORS : Alternators – Constructional features – Principle of operation – Types - EMF Equation – Distribution and Coil span factors – Predetermination of regulation by Synchronous Impedance Method – OC and SC tests.

UNIT - V

ELECTRICAL INSTRUMENTS: Basic Principles of indicating instruments – Moving Coil and Moving iron Instruments (Ammeters, Voltmeters and Energy Meters)

TEXT BOOK

Introduction to Electrical Engineering – M.S Naidu and S. Kamakshaiah, TMH Publ.

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REFERENCES

1. Principles of Electrical Engineering - V.K Mehta, S.Chand Publications.
2. Theory and Problems of basic electrical engineering - I.J. Nagarath amd D.P Kothari, PHI Publications
3. Essentials of Electrical and Computer Engineering - David V. Kerns, JR. J. David Irwin
4. Basic Electrical Engineering - T.K. Nagasarkar and M.S.Sukhija, Oxford University Press, 2005

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T304 – SENSORS AND SIGNAL CONDITIONING

Lecture	**: 4 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**: 1**	**External Marks**	**: 75**
Credits	**: 4**	**External Examination**	**: 3 Hrs**

UNIT - I

Introduction to measurement systems: general concepts and terminology, measurement systems, sensor classification, general input-output configuration, methods of correction. - **Performance characteristics:** static characteristics of measurement systems, accuracy, precision, sensitivity, other characteristics: linearity, resolution, systematic errors , random errors, dynamic characteristics of measurement systems: zero-order, first-order, and second-order measurement systems and response.

UNIT - II

Resistive sensors & Signal conditioning for resistive sensors:: potentiometers , strain gages and types, resistive temperature detectors (rtds) , thermistors , magneto resistors, light-dependent resistors (ldrs) - measurement of resistance , voltage dividers , Wheatstone bridge. Balance and deflection measurements, sensor bridge calibration and compensation instrumentation amplifiers, interference types and reduction

UNIT - III

Reactance variation and electromagnetic sensors: capacitive sensors – variable & differential, inductive sensors - reluctance variation, eddy current, linear variable differential transformers (LVDTS), variable transformers: synchros, resolvers, inductosyn , magneto elastic sensors, electromagnetic sensors - sensors based on faraday's law, hall effect sensors

UNIT - IV

Signal conditioning for reactance variation sensors: problems and alternatives, ac bridges, carrier amplifiers - application to the LVDT, variable oscillators, resolver-to- digital and digital-to-resolver converters

UNIT - V

Self-generating sensors & Signal conditioning for self-generating sensors thermoelectric sensors, piezoelectric sensors, pyroelectric sensors, photovoltaic sensors , electrochemical sensors - chopper and low-drift amplifiers, offset and drifts amplifiers , electrometer amplifiers, charge amplifiers, noise in amplifiers

TEXT BOOK

Sensors and Signal Conditioning: Ramon PallásAreny,John G. Webster; 2nd edition, John Wiley and Sons, 2000.

REFERENCES

1. Sensors and Transducers – D.Patranabis, TMH 2003.
2. Sensor Technology Handbook – Jon Wilson, Newne 2004.
3. Instrument Transducers – An Introduction to Their Performance and Design – by Herman K.P. Neubrat, Oxford University Press.
4. Measurement System: Applications and Design – by E.O. Doeblin, McGraw Hill Publications.

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P825 – ELECTRICAL TECHNOLOGY LAB

Lecture	**: 3 Periods/week**	**Internal Marks**	**: 25**
		External Marks	**: 75**
Credits	**: 2**	**External Examination**	**: 3 Hrs**

PART – A

1. Serial and Parallel Resonance – Timing, Resonant frequency, Bandwidth and Q-factor determination for RLC network.
2. Time response of first order RC/RL network for periodic non-sinusoidal inputs – time constant and steady state error determination.
3. Two port network parameters – Z-Y Parameters, chain matrix and analytical verification.
4. Verification of Superposition and Reciprocity theorems.
5. Verification of maximum power transfer theorem. Verification on DC,verification on AC with Resistive and Reactive loads.
6. Experimental determination of Thevenin's and Norton's equivalent circuits and verification by direct test.

PART – B

1. Magnetization characteristics of D.C. Shunt generator. Determination of critical field resistance.
2. Swinburne's Test on DC shunt machine (Predetermination of efficiency of a given DC Shunt machine working as motor and generator).
3. Brake test on DC shunt motor. Determination of performance characteristics.
4. OC & SC tests on Single-phase transformer (Predetermination of efficiency and regulation at given power factors and determination of equivalent circuit).
5. Brake test on 3-phase Induction motor (performance characteristics).
6. Regulation of alternator by synchronous impedance method.

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P839 – INSTRUMENTATION – I LAB.

Lecture	**: 3 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**:**	**External Marks**	**: 75**
Credits	**: 2**	**External Examination**	**: 3 Hrs**

LIST OF EXPERIMENTS :

1. Conversion of D'Arsonval Galvanometer into D C meters. (Current & voltage).
2. Conversion of D'Arsonval Galvanometer into A C meters. (Current & voltage).
3. Conversion of D'Arsonval Galvanometer into Ohm- meter.
4. Measurement of RLC and Q using Q-meter.
5. Measurement of Strain using Strain gauge.
6. Measurement of R,L &C using Bridge circuits.
7. RTD Characteristics.
8. LVDT Characteristics.
9. Inductive & Capacitive Transducers.
10. Piezo electric transducer.
11. Bourdon tube.
12. Acceleration Transducer.

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P826 – ELECTRONIC CIRCUITS LAB.

Lecture	**: 3 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**:**	**External Marks**	**: 75**
Credits	**: 2**	**External Examination**	**: 3 Hrs**

I) **LIST OF EXPERIMENTS**

1. Common Emitter and Common Source amplifier
2. Two Stage RC Coupled Amplifier
3. Current shunt Feedback Amplifier
4. Cascade Amplifier
5. Class A Power Amplifier (Transformer less)
6. Class B Complementary Symmetry Amplifier
7. High Frequency Common base (BJT) / Common gate (JFET) Amplifier.

II) **Testing in the Hardware Laboratory (Six Experiments : 3 + 3) :**

(A) Any Three circuits simulated in Simulation laboratory

(B) Any Three of the following

a. Class A Power Amplifier (with transformer load)
b. Class B Power Amplifier
c. Single Tuned Voltage Amplifier
d. Series Voltage Regulator
e. Shunt Voltage Regulator

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V-SEMESTER

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T235 – LINEAR AND DIGITAL IC APPLICATIONS

Lecture	**: 4 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**: 1**	**External Marks**	**: 75**
Credits	**: 4**	**External Examination**	**: 3 Hrs**

OBJECTIVE

To teach the basic concepts in the design of electronic circuits using linear integrated circuits and their applications in the processing of analog signals.

UNIT - I

OPERATIONAL AMPLIFIER

Basic information of Op-amp, ideal and practical Op-amp, internal circuits, Op-amp characteristics, DC and AC characteristics, 741 op-amp and its features, modes of operation-inverting, non-inverting, differential.

Basic application of Op-amp, instrumentation amplifier, ac amplifier, V to I and I to V converters, sample & hold circuits, multipliers and dividers, Differentiators and Integrators, Comparators, Schmitt trigger, Multivibrators, introduction to voltage regulators, features of 723.

UNIT - II

ACTIVE FILTERS & OSCILLATORS

Introduction, 1^{st} order LPF, HPF filters. Band pass, Band reject and all pass filters. Oscillator types and principle of operation – RC, Wien and quadrature type, waveform generators – triangular, sawtooth, square wave and VCO.

UNIT - III

TIMERS & PHASE LOCKED LOOPS

Introduction to 555 timer, functional diagram, monostable and astable operations and applications, Schmitt Trigger. PLL - introduction, block schematic, principles and description of individual blocks of 565.

CONVERTERS

Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, and IC 1408 DAC, Different types of ADCs - parallel comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC. DAC and ADC specifications.

UNIT - IV

LOGIC FAMILIES

Classification of Integrated circuits, comparison of various logic families, standard TTL NAND Gate – Analysis & characteristics, TTL open collector O/Ps, Tristate TTL, MOS & CMOS open drain and tristate outputs, CMOS transmission gate, IC interfacing - TTL driving CMOS & CMOS driving TTL .

Design using TTL -74XX & CMOS 40XX series, code converters, decoders, Demultiplexers, decoders & drives for LED & LCD display. Encoder, priority Encoder, multiplexers & their applications, priority generators/checker circuits. Digital arithmetic circuits-parallel binary adder/subtractor circuits using 2's Complement system, Digital comparator circuits.

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UNIT - V

SEQUENTIAL CIRCUITS & MEMORIES

74XX & CMOS 40XX series of IC counters.
ROM architecture, types & applications, RAM architecture, Static & Dynamic RAMs, synchronous DRAMs.

TEXT BOOKS

1. Linear Integrated Circuits – D. Roy Chowdhury, New Age International (p) Ltd, 2nd Ed., 2003.
2. Digital Fundamentals – Floyd and Jain, Pearson Education, 8th Edition, 2005.

REFERENCE BOOKS

1. Operational Amplifiers and Linear Integrated Circuits – R.F. Coughlin and Fredrick F. Driscoll, PHI, 1977.
2. Operational Amplifiers and Linear Integrated Circuits: Theory and Applications – Denton J. Daibey, TMH.
3. Design with Operational Amplifiers and Analog Integrated Circuits - Sergio Franco, McGraw Hill, 3rd Ed., 2002.
4. Applications and Design with Analog Integrated Circuits by J.Michael Jacob 2nd Edition, PHI, 2000.
5. Op-Amps & Linear ICs – Ramakanth A. Gayakwad, PHI, 1987.

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T306 – SIGNALS AND SYSTEMS

Lecture	**: 4 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**: 1 Period/Week**	**External Marks**	**: 75**
Credits	**: 4**	**External Examination**	**: 3 Hrs**

UNIT - I

SIGNAL ANALYSIS : Classification of signals, Analogy between vectors and signals, Norm of a Vector, Orthogonal signal space, Signal approximation using orthogonal functions, Mean square error, Closed or complete set of orthogonal functions, Orthogonality in complex functions, Exponential and sinusoidal signals, Concepts of Impulse function, Unit step function, Signum function.

UNIT - II

FOURIER SERIES AND FOURIER TRANSFORMS: Representation of Fourier series, Continuous time periodic signals, properties of Fourier series, Dirichlet's conditions, Trigonometric Fourier series and Exponential Fourier series, Complex Fourier spectrum, Deriving Fourier transform from Fourier series, Fourier transform of arbitrary signal, Fourier transform of standard signals, Fourier transform of periodic signals, properties of Fourier transforms, Fourier transforms involving impulse function and Signum function. Introduction to Hilbert Transform and its application to Band Pass signals.

UNIT - III

SIGNAL TRANSMISSION THROUGH LINEAR SYSTEMS: Classification of Systems, impulse response, Response of a linear system, convolution in time domain and frequency domain, Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics, relationship between bandwidth and rise time. Cross correlation and auto correlation of functions, properties of correlation function, Relation between convolution and correlation, Energy density spectrum, Parseval's theorem, Power density spectrum, Relation between auto correlation function and energy/power spectral density function.

UNIT - IV

LAPLACE TRANSFORMS : Review of Laplace transforms, Partial fraction expansion, Inverse Laplace transform, Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals, Properties of L.T's relation between L.T's, and F.T. of a signal. Laplace transform of certain signals using waveform synthesis.

UNIT - V

Z–TRANSFORMS : Fundamental difference between continuous and discrete time signals, discrete time signal representation using complex exponential and sinusoidal components, Periodicity of discrete time using complex exponential signal, Concept of Z- Transform of a discrete sequence. Distinction between Laplace, Fourier and Z transforms. Region of convergence in Z-Transform, constraints on ROC for various classes of signals, Inverse Z-transform, properties of Z-transforms.

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TEXT BOOK

Signals, Systems & Communications - B.P. Lathi, BS Publications, 2003.

REFERENCES

1. Signals & Systems - Simon Haykin and Van Veen,Wiley, 2nd Edition.
2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI, 2nd Edn.
3. Communication Systems - Simon Haykin, John Wiley, 2nd Ed.
4. Signals, Systems and Transforms - C. L. Philips, J.M.Parr and Eve A.Riskin, Pearson education.3rd Edition, 2004.

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T148 – CONTROL SYSTEMS

Lecture	: 4 Periods/week	Internal Marks	: 25
Tutorial	: 1 Period/Week	External Marks	: 75
Credits	: 4	External Examination	: 3 Hrs

OBJECTIVE

In this course it is aimed to introduce to the students the principles and applications of control systems in everyday life. The basic concepts of the block diagram reduction, time domain analysis solutions to time invariant systems and also deals with the different aspects of stability analysis of systems in frequency domain and time domain.

UNIT - I

Control system modeling
Concepts of control systems- Open loop and closed loop control systems. Characteristics of feedback control systems: System concept, differential equations and transfer functions. Modeling of electric systems, translational and rotational mechanical systems, and Simple electromechanical systems. Block diagram representation of systems – Block diagram reduction methods – Closed loop transfer function, determination of signal flow graph. Mason's gain formulaControl System Components: Stepper motors – AC servo motor – DC servo motor – Synchros.

UNIT - II

Time domain analysis
Test signals – time response of first order and second order systems – time domain specifications – types and order of systems – generalized error co-efficient – steady state errors – concepts of stability – Routh-Hurwitz stability – root locus.

UNIT - III

Frequency domain analysis
Introduction – correlation between time and frequency response – stability analysis using Bode plots, Polar plots, Nichols chart and Nyquist stability criterion – Gain margin – phase margin.

UNIT - IV

Compensators
Realization of basic compensators – cascade compensation in time domain and frequency domain and feedback compensation – design of lag, lead, lag-lead compensator using Bode plot and Root locus. Introduction to P, PI and PID controllers.

UNIT - V

State variable analysis
State variable methods - introduction to the state variable concept - state space models - physical variable - phase variable and diagonal forms from time domain - diagonalisation - solution of state equations - homogenous and non homogenous cases- properties of state transition matrix - relation between transfer function and state space models , Controllability and Observability.

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TEXT BOOKS

Modern Control Engineering, Ogata.K, Prentice Hall of India, 5th Edition.

REFERENCES

1. Automatic Control Systems, Benjamin.C.Kuo, 7th Edition – Prentice Hall of India, 2002.
2. Control Systems, M.Gopal, Tata McGraw-Hill, 1997.
3. "*Modern Control Systems*", Dorf R.C. & Bishop R.H., Addison Wesley.
4. Control System Engineering, 3rd Edition, Nagrath & Gopal, New Age International Edition, 2002.

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T146 – COMPUTER ORGANIZATION

Lecture	**: 4 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**: 1**	**External Marks**	**: 75**
Credits	**: 3**	**External Examination**	**: 3 Hrs**

UNIT - I

Register Transfer Language And Microoperations: Register Transfer language, register Transfer Bus and memory transfers, Arithmetic Mircrooperatiaons, logic micro operations, shift micro operations, Arithmetic logic shift unit.

Basic Computer Organization And Design: Instruction codes. Computer Registers ,Computer instructions– Instruction cycle. Memory – Reference Instructions. Input – Output and Interrupt.

UNIT - II

Micro Programmed Control: Control memory, Address sequencing, microprogram example, design of control unit Hard wired control. Micro programmed control **Central Processing Unit:** STACK organization. Instruction formats. Addressing modes. DATA Transfer and manipulation. Program control. Reduced Instruction set computer.

UNIT - III

Pipelining And Vector Processing: parallel processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC pipeline, Vector Processing

Computer Arithmetic : Data Representation. Fixed Point Representation. Floating – Point Representation ,Addition and subtraction, multiplication Algorithms, Division Algorithms, Floating – point Arithmetic operations. Decimal Arithmetic unit Decimal Arithmetic operations

UNIT IV

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory. Associative Memory Cache Memory, Virtual Memory

UNIT V

INPUT-OUTPUT ORGANIZATION : Peripheral Devices, Input-Output Interface, Asynchronous data transfer Modes of Transfer, Priority Interrupt, Direct memory Access, Input –Output Processor (IOP) Serial communication

TEXT BOOK

Computer Systems Architecture – M.Moris Mano, IIIrd Edition, Pearson/PHI

REFERENCES

1. Computer Organization – Carl Hamacher, Zvonks Vranesic, SafeaZaky, Vth Edition, McGraw Hill.
2. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI
3. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition PHI/Pearson
4. Fundamentals or Computer Organization and Design, - Sivaraama Dandamudi Springer Int.Edition.

T254 – MICROPROCESSOR AND INTERFACING

Lecture	**: 4 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**:**	**External Marks**	**: 75**
Credits	**: 4**	**External Examination**	**: 3 Hrs**

UNIT-I

Architecture of 8086 Microprocessor, Special functions of General purpose registers. 8086 flag register and function of 8086 Flags, Addressing modes of 8086. Instruction set of 8086. Assembler directives, simple programs, procedures, and macros, Assembly language programs involving logical, Branch & Call instructions, sorting, evaluation of arithmetic expressions, string manipulation.

UNIT-II

Pin diagram of 8086-Minimum mode and maximum mode of operation, Timing diagram, Memory interfacing to 8086 (Static RAM & EPROM), Need for DMA. DMA data transfer Method, Interfacing with 8237/8257.

UNIT-III

8255 PPI – various modes of operation and interfacing to 8086, Interfacing Keyboard, Displays, 8279 Stepper Motor and actuators, D/A and A/D converter interfacing.

UNIT-IV

Interrupt structure of 8086. Vector interrupt table. Interrupt service routines. Introduction to DOS and BIOS interrupts, 8259 PIC Architecture and interfacing cascading of interrupt controller and its importance, Serial data transfer schemes. Asynchronous and Synchronous data transfer schemes, 8251 USART architecture and interfacing, TTL to RS 232C and RS232C to TTL conversion, Sample program of serial data transfer, Introduction to High-speed serial communications standards, USB.

UNIT-V

Introduction to 80286, Salient Features of 80386, Real and Protected Mode Segmentation & Paging, Salient Features of Pentium, Branch Prediction. 8051 Microcontroller Architecture, Register set of 8051, Modes of timer operation, Serial port operation, Interrupt structure of 8051, Memory and I/O interfacing of 8051.

TEXT BOOKS

1. Microprocessors and Interfacing 2nd revised edition – Douglas V. Hall, Tata Mc. Graw Hill.
2. The 8051 Microcontroller, 3rd Edition – Kenneta J. Ayala, Thomson Delmar learning.

REFERENCES

1. Advanced microprocessor and Peripherals, 2nd Edition - A.K.Ray, K.M.Bhurchandi, Tata Mc. Graw Hill.
2. The 8086/8088 family: Design Programming and Interfacing, John Uffenbeck, PHI Learning.
3. Micro Controllers: Theory and Applications Ajay V. Deshmukh, Tata Mc.Graw Hill

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T287 – PROCESS CONTROL INSTRUMENTATION

Lecture	**: 4 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**: 1**	**External Marks**	**: 75**
Credits	**: 4**	**External Examination**	**: 3 Hrs**

UNIT - I

PROCESS DYNAMICS: Process variables-load variables-dynamics of simple pressure, flow, level and temperature process-Interacting and Non interacting systems-continuous and batch process-self regulation.

UNIT – II

CONTROL ACTIONS AND CONTROLLERS: Basic control actions- character sticks of two-position, three position, single speed and multiple floating, proportional, integral, and derivative control modes, PI, PD, PID control modes-problems. - Pneumatic, hydraulic and electronic controllers to realize various control actions.

UNIT - III

CONTROLLER SETTINGS AND TUNING: Evaluation criteria- $1/4^{th}$ decay ratio, IAE, ISE, ITAE- Determination of optimum settings for mathematically described process using time response and frequency response. - Tuning-process reaction curve method- continuous oscillation method- damped oscillation method-problems.

UNIT - IV

FINAL CONTROL ELEMENTS : I/P converter, P/I converter- pneumatic, electric and hydraulic actuators.- Control valves- character sticks of control valves –Globe, Butterfly, diaphragm and ball valves-control valve sizing, problems

UNIT - V

MULTI LOOP CONTROL SYSTEMS : Cascade control, feed forward control, ratio control, split range, multi variable control.

TEXT BOOKS

1. Chemical process control by Stephanopoulos PHI, New Delhi, 1999.
2. Process control-Harriot.p.TMH, 1991

REFERENCES

1. Automatic process control-D.P.ECKMAN
2. Process systems analysis and control- Coughahows MCGraw Hill
3. Process control- B.G.Liptake

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T290 – PROFESSIONAL ETHICS

Lecture	**: 4 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**: 1 Period/Week**	**External Marks**	**: 75**
Credits	**: 3**	**External Examination**	**: 3 Hrs**

UNIT - I

ENGINEERING ETHICS

Senses of 'Engineering Ethics' variety of moral issued types of inquiry moral dilemmas moral autonomy Kohlberg's theory Gilligan's theory consensus and controversy – Models of Professional Roles theories about right action Selfinterest customs and religion uses of ethical theories.

UNIT - II

HUMAN VALUES

Morals, Values and Ethics – Integrity – Work Ethic – Service Learning – Civic Virtue – Respect for Others – Living Peacefully – caring – Sharing – Honesty – Courage – Valuing Time – Cooperation – Commitment – Empathy – SelfConfidence – Character – Spirituality

UNIT - III

ENGINEERING AS SOCIAL EXPERIMENTATION

Engineering as experimentation engineers as responsible experimenters codes of ethics a balanced outlook on law the challenger case study

UNIT - IV

SAFETY, RESPONSIBILITIES AND RIGHTS

Safety and risk assessment of safety and risk risk benefit analysis and reducing risk the three mile island and chernobyl case studies. Collegiality and loyalty respect for authority collective bargaining confidentiality conflicts of interest occupational crime professional rights employee rights Intellectual Property Rights (IPR) discrimination.

UNIT - V

GLOBAL ISSUES

Multinational corporations Environmental ethics computer ethics weapons development engineers as managersconsulting engineersengineers as expert witnesses and advisors moral leadershipsample code of Ethics (Specific to a particular Engineering Discipline).

TEXT BOOKS

1. Mike Martin and Roland Schinzinger, "Ethics in engineering", McGraw Hill, New York 1996.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, " Engineering Ethics", Prentice Hall of India, New Delhi, 2004.

REFERENCES

1. Charles D. Fleddermann, "Engineering Ethics", Pearson Education/ Prentice Hall, New Jersey,2004 (Indian Reprint now available)
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, " Engineering Ethics – Concepts and Cases", Wadsworth Thompson Leatning, United States, 2000 (Indian Reprint now available)
3. John R Boatright, " Ethics and the Conduct of Business", Pearson Education, New Delhi, 2003.
4. Edmund G Seebauer and Robert L Barry, " Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2001.

P847 – LINEAR IC APPLICATIONS LAB.

Lab.	**: 3 Periods/week**	**Internal Marks**	**: 25**
		External Marks	**: 75**
Credits	**: 2**	**External Examination**	**: 3 Hrs**

LIST OF EXPERIMENTS:

1. OP-Amp applications-Adder ,Subtractor & Comparator circuits.
2. Integrator & Differentiator circuits using IC 741.
3. Active filter applications-LPF & HPF (First order).
4. Active filter applications-BPF , Band Reject (Wide band)& Notch filters.
5. IC 741 oscillator circuits-Phase shift & Wien bridge oscillator.
6. Function generator using OP-Amps.
7. IC 555 Timer-Monostable Multivibrator.
8. IC 555 Timer-Astable Multivibrator.
9. Schmitt Trigger using IC 741 & IC 555.
10. IC 565 - PLL applications.
11. IC 566 - VCO applications.
12. Voltage regulator using IC 723.
13. Three terminal voltage regulators-7805,7809 & 7912.
14. 4-bit DAC using OP-Amp.

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P865 – PROCESS CONTROL LAB.

Lab.	**: 3 Periods/week**	**Internal Marks**	**: 25**
		External Marks	**: 75**
Credits	**: 2**	**External Examination**	**: 3 Hrs**

LIST OF EXPERIMENTS:

1. Flow control.
2. Level Control.
3. Temperature Control.
4. Pressure Control.
5. I/P Converter.
6. Control valve (Quick opening &,Linear)Characteristics.
7. P/I converter.
8. Process control Simulator.
9. D C Servo motor controller.
10. Multi-loop control systems-Cascade & Ratio.
11. Temperature Transmitter.
12. Flow Transmitter.
13. Level Transmitter.
14. Pressure Transmitter.

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VI-SEMESTER

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T125 – AUTOMATION OF INDUSTRIAL PROCESS

Lecture	**: 4 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**: 1**	**External Marks**	**: 75**
Credits	**: 4**	**External Examination**	**: 3 Hrs**

UNIT - I

INTRODUCTION TO COMPUTER CONTROL: Role of computers in the control of Industrial processes (plants). Elements of Computer Controlled Process / Plant. Classification – Batch, Continuous, Supervisory and Direct Digital Controls. Architecture – Centralized, Distributed and Hierarchical Systems. Man Machine or Human Computer Interface (HCI).

UNIT - II

BUILDING BLOCKS - Process Control Requirements of Computers. Process related variables. Computer Network. Communications in Distributed control Systems. Smart Sensors and Field bus.

UNIT - III

CONTROL SYSTEM DESIGN - Control System Design – Heuristics, Structural Controllability and Relative Gain Array. Controller Design – Regulator design and other design considerations. Controller Tuning – P, PI, PID, and Ziegler-Nicholas method. Computer aided Control System Design. -Computer control loop, Modified Z – Transform, Zero-order hold equivalence, First order system with time delay, Converting continuous time controller to discrete time domain, Design of controllers based on discrete time model – Deadbeat and Dahlin's algorithms.

UNIT - IV

ADVANCED STRATEGIES - Predictive Control – Model based and Multivariable System. Adaptive Control – Adjustment, Schemes, and Techniques Inferential Control. Intelligent Control. Statistical Process Control. Algorithms for Processes with Dead Time – Smith Predictor (SP), Analytical Predictor (AP). Optimal Control

UNIT - V

DISTRIBUTED DIGITAL CONTROL - Programmable logic controllers (PLC)- Architecture , Selection. Overview of Distributed Digital Control System (DCS). DCS Software configuration. DCS Communication – Data Highway. DCS Supervisory computer Tasks. DCS Integration with PLCs and Computers.

TEXT BOOK

Computer Aided Process Control – S.K.Singh. PHI 2004

REFERENCES

1. Computer Control of Processes – M.Chidambaram. Narosa 2003.
2. Computer-based Industrial Control by Krishna Kanth. PHI 1997
3. Real Time Control: An Introduction – second edition - S. Bennett, Pearson Education India 2003.

T221 - INDUSTRIAL MANAGEMENT

Lecture	**: 4 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**:**	**External Marks**	**: 75**
Credits	**: 3**	**External Examination**	**: 3 Hrs**

AIM

To make the student to understand concepts and contributions of Management, types of Organizations and also prepare them to have knowledge of several types of managements conducted in Industrial Organizations.

UNIT - I

Introduction
Management- Definition, Nature, importance and Functions of Management-Taylor's Scientific Management Theory, Fayol's Principles of Management, Contribution of Elton Mayo, Maslow, Herzberg, Douglas Mc Gregor. Basic concepts of Organization – Authority, Responsibility, Delegation of Authority, Span of Control, Departmentation and Decentralization-Organization Structures (Line organization, Line and staff organization, functional organization, Committee organization, matrix organization)

UNIT - II

Operations Management
Plant Location, Factors influencing location, Principles and Types of Plant Layouts-Methods of production (Job, batch and Mass Production), Work Study -Basic procedure involved in Method Study and Work Measurement.

UNIT - III

Quality and Materials Management
Statistical Quality Control-Meaning, variables and attributes- X chart, R chart, C chart, P chart, (simple Problems), Acceptance Sampling, Sampling plans, Deming's contribution to quality. Materials Management-Objectives, Need for Inventory control, Purchase Procedure, Store records, EOQ, ABC Analysis, stock levels.

UNIT - IV

Human Resource Management
HRM : Concepts of HRM, Basic functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development, Placement, Wage and Salary Administration, Promotion, Transfer, Separation, Performance Appraisal, Job Evaluation and Merit Rating.

UNIT - V

Project Management
Early techniques in Project Management- Network Analysis: Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), identifying critical path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing (simple problems).

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TEXT BOOK

Dr. Aryasri: Management Science, TMH, 4th edition, 2009.

REFERENCES

1. Koontz and Weihrich – Essentials of Management, TMH, 8th edition, 2010
2. Stoner, Freeman, Gilbert, Management, 6th Ed, Pearson Education, New Delhi, 2004
3. O.P.Khana, Industrial Engineering and Management
4. L.S. Srinath, PERT & CPM

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T140 –COMMUNICATION SYSTEMS

Lecture	**: 4 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**: 1**	**External Marks**	**: 75**
Credits	**: 4**	**External Examination**	**: 3 Hrs**

OBJECTIVE

To understand theory and principles of modern communication systems that addresses the variety, reality, complexity, and pervasiveness of today's communication systems Topics included are AM modulation transmission and reception, FM modulation transmission and reception, single sideband communication (SSB) communication technique, Digital, wi communication and wireless digital communication.

UNIT - I

AMPLITUDE MODULATION SYSTEMS

Need for modulation, normal AM, generation and demodulation (envelop & synchronous detection), modulation index, SSB: Generation using filter and phasing method, detection. Frequency division multiplexed systems using SSB.

UNIT - II

ANGLE MODULATION SYSTEMS

Concept of frequency and phase modulation, frequency deviation and modulation index, FM spectra, Carson's rule, narrowband FM, generation of wideband FM Armstrong method, direct FM generation. Demodulation of FM discriminatory, PPL.

UNIT - III

SAMPLING AND DISCRETE TIME MODULATIONS

Sampling theorem – low pass and band pass, Pulse Amplified Modulation (PAM), Pulse width Modulation (PWM), Pulse Position Modulation (PPM) their generation and detection-phase time division multiplying

Review of random signals and noise, signal to noise ratio in amplitude and angle modulated systems. Thermal shot noise.

UNIT - IV

DIGITAL COMMUNICATION

PCM, Quantization noise, bandwidth, advantages over analog communication, PCM system, Differential PCM, Delta Modulation, Digital Modulation – Concepts of ASK, and Concepts of FSK, and Concepts of PSK , and Concepts of DPSK, Digital Multiplexing.

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UNIT - V

SATELLITE & FIBRE OPTIC COMMUNICATIONS

Transmit and Receive Antennas, Line of sight systems, satellite link-GT ratio of earth station, VSATS and Concepts of FDMA, and Concepts of TDMA, Concepts of CDMA. OPTICAL COMMUNICATION SYSTEMS-Types of optical fibres – step index & graded index, Numerical aperture, multimode and single mode. Attenuation and dispersion in fibers. Optical transmitters LEDS and Laser Diode. Optical Receivers – PIN and APDs.

TEXT BOOKS

1. "Communication Systems", 3rd Edition, Haykins Simon, John Wiley, Singapore, 1984.
2. "Modern Communication Systems", Couch Lenon, W. Prentice Hall, India 1998.

REFERENCES

1 "Optical Fiber Communications", 2nd Edition, Keiser Gerd, McGraw Hill (international Student Edition), 1991.
2. "Modern Digital & Analog Communication System", Lathi, Oxford University

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T266 – OBJECT ORIENTED PROGRAMMING (C++)

Lecture	**: 4 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**: 1**	**External Marks**	**: 75**
Credits	**: 4**	**External Examination**	**: 3 Hrs**

UNIT - I

Introduction
OOP Paradigm ,OOPS principles, Merits of OOP languages, Demerits of Procedure Oriented Programming languages,C++ Overview, Data types, Identifers,Operators,Type casting, C++ Characteristics, Difference between class and structure, declaration of variables, dynamic initialization of variables, *new* and *delete* operators, I/O Manipulators.

UNIT - II

Classes and Objects:
Defining Classes in C++, accessing class members, access specifiers(Public and Private),defining member functions, static data members, static member functions, friend functions, friend classes, inline functions, nested classes, passing objects to functions, returning objects, object assignment, Array of objects, Constructor and Destructor , *constant* and *volatile* keywords, constant and volatile member functions

UNIT - III

Inheritance:
Base class, derived class, access specifier (Protected), scope rules, abstract base class, virtual base class, single inheritance, multiple inheritance, multilevel inheritance, hierarchical inheritance and hybrid inheritance, calling base class constructors.
String class-Usage of standard library *string class* with example programs.

UNIT - IV

Polymorphism:
Pointers, Pointers to objects, 'this' Pointer, Pointers to derived Classes. Concept of Polymorphism, Compile time Polymorphism: Operator Overloading, Overloading Unary Operators, and Overloading Binary Operators, Function Overloading,
Run time Polymorphism: Virtual functions, Pure Virtual Functions.
Templates: Introduction, Class Templates, Function Templates.

UNIT - V

Files and Exception Handling:
Exception Handling: Introduction, Mechanism, throw, catch, Specifying Exceptions.
I/O Streams: C++ Streams, C++ Stream classes, Unformatted I/O Operations, Formatted I/O Operations, Formatting using Manipulators.
C++ Files: Introduction, Classes for file stream Operations, Opening and closing a file, detecting end-of-file, I/O Operations, command line arguments.

TEXT BOOK
Herbert Schildt, The Complete Reference C++, Fourth Edition, Tata McGraw Hill.

REFERENCES
1. E.Balaguruswamy, Object Oriented Programming with C++, Third Edition, TMH.
2. Deitel & Deitel, C++ How to Program, Third Edition, Pearson Education.
3. Ashok N Kamthane, Object Oriented Programming with ANSI& Turbo C++

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T253 – MICROCONTROLLER AND APPLICATIONS

Lecture	: 4 Periods/week	Internal Marks	: 25
Tutorial	: 1	External Marks	: 75
Credits	: 4	External Examination	: 3 Hrs

UNIT - I

OVERVIEW OF ARCHITECTURE AND MICROCONTROLLER RESOURCES : Architecture of a microcontroller – Microcontroller resources – Resources in advanced and next generation microcontrollers – 8051 microcontroller – Internal and External memories – Counters and Timers – Synchronous serial-cum-asynchronous serial communication - Interrupts.

UNIT - II

8051 FAMILY MICROCONTROLLERS INSTRUCTION SET : Basic assembly language programming – Data transfer instructions – Data and Bitmanipulation instructions – Arithmetic instructions – Instructions for Logical operations on the tes among the Registers, Internal RAM, and SFRs – Program flow control instructions – Interrupt control flow.

UNIT - III

REAL TIME CONTROL : INTERRUPTS & TIMERS : Interrupt handling structure of an MCU – Interrupt Latency and Interrupt deadline – Multiple sources of the interrupts – Non-maskable interrupt sources – Enabling or disabling of the sources – Polling to determine the interrupt source and assignment of the priorities among them – Interrupt structure in Intel 8051. - Programmable Timers in the MCU's – Free running counter and real time control – Interrupt interval and density constraints.

UNIT - IV

SYSTEMS DESIGN : DIGITAL AND ANALOG INTERFACING METHODS : Switch, Keypad and Keyboard interfacings – LED and Array of LEDs – Keyboard cum- Display controller (8279) – Alphanumeric Devices – Display Systems and its interfaces – Printer interfaces – Programmable instruments interface using IEEE 488 Bus – Interfacing with the Flash Memory – Interfaces – Interfacing to High Power Devices – Analog input interfacing – Analog output interfacing – Optical motor shaft encoders – Industrial control – Industrial process control system – Prototype MCU based Measuring instruments – Robotics and Embedded control – Digital Signal Processing and Digital Filters.

UNIT - V

REAL TIME OPERATING SYSTEM FOR MICROCONTROLLERS : Real Time operating system – RTOS of Keil (RTX51) – Use of RTOS in Design –Software development tools for Microcontrollers.

TEXT BOOK

1. Microcontrollers Architecture, Programming, Interfacing and System Design –Raj Kamal, Pearson Education, 2005.

REFERENCES

1. The 8051 Microcontroller and Embedded Systems – Mazidi and Mazidi, PHI,2000.
2. Microcontrollers (Theory & Applications) – A.V. Deshmuk, WTMH, 2005.
3. Design with PIC Microcontrollers – John B. Peatman, Pearson Education, 2005.

T277 – POWER PLANT INSTRUMENTATION

Lecture	**: 4 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**:**	**External Marks**	**: 75**
Credits	**: 3**	**External Examination**	**: 3 Hrs**

UNIT - I

BRIEF OVERVIEW OF POWER GENERATION- Hydro, thermal, Nuclear, solar, wind etc, Importance of instrumentation for power generation- Thermal power plants – Building blocks – Details of boiler processes – PI diagrams of boiler – co-generation – brief description of transmission and grids.

UNIT - II

VARIOUS PARAMETERS AND MEASUREMENTS IN POWER PLANTS: Electrical measurements – Current, Voltage, Power, Frequency, Power factor, trivector meter. Non electrical parameters, feed water flow, fuel, air and steam with correction factors for temperature. Pressure, temperature, level measurements-smoke density measurements - Dust monitor- flue gas parameters.

UNIT - III

BOILER CONTROL & MONITORING SYSTEMS IN THERMAL POWER PLANTS: Combustion Control – control of main header pressure, air & fuel ratio control – furnace draft and excess air control – Drum level (3 element) control – main and reheat temperature control, burner tilt up, by pass damper, super heater controls. ID & FD fan air flow controls – Spray and Gas recirculation control – Boiler Feed Pump recirculation Control – Hot well and deaerator level control – Control systems in Raw material (Coal) handling – Pulverizer Control – Computers in power plants.

UNIT - IV

TURBINE AND ALTERNATOR MONITORING & CONTROL: Condenser Vacuum Control – Gland Steam exhaust pressure control – Speed, Vibration, Shell and Bearing Temperature monitor and control – Lubricating oil temperature control – Alternator vibration monitoring – Hydrogen generator cooling system.

UNIT - V

ANALYSIS INSTRUMENTS IN POWER PLANTS: Thermal conductive type – Paramagnetic type oxygen analyzers- field mount type oxygen analyzers – Infra red type – trim analyzer – spectrum analyzer – Hydrogen Purity meter – Chromatography – pH meter – conductivity cell – Fuel analyzer – Pollution monitoring and control instruments and analyzers.

TEXT BOOK

Power Plant Engineering: BLACK & VEATCH.
Publisher: Chapman & Hall Inc- New York, CBS Publishers & Distributors, New Delhi (for Indian Reprint edition)- 2005.

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REFERENCES

1. Modern Power Station Practice, Vol. 6, Instrumentation, Controls and Testing – Pergamon Press, Oxford, 1971.
2. The Control of Boilers – 2nd Edition - By Sam G Dukelow – ISA Publication.
3. Stand Boiler Operations – Questions and Answers – by Elokna S.M. and Kohal A.L.., TMH, New Delhi, 1994

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T336 – VIRTUAL INSTRUMENTATION

Lecture	**: 4 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**:**	**External Marks**	**: 75**
Credits	**: 3**	**External Examination**	**: 3 Hrs**

UNIT - I

VIRTUAL INSTRUMENTATION: Historical perspective, advantages, block diagram and architecture of a virtual instrument, data-flow techniques, graphical programming in data flow, and comparison with conventional programming. Development of Virtual Instrument using GUI, Real-time systems, Embedded Controller, OPC, HMI / SCADA software, Active X programming.

UNIT - II

VI PROGRAMMING TECHNIQUES: VIS and sub-VIS, loops and charts, arrays, clusters and graphs, case and sequence structures, formula nodes, local and global variables, string and file I/O, Instrument Drivers, Publishing measurement data in the web.

UNIT - III

DATA ACQUISITION BASICS: Introduction to data acquisition on PC, Sampling fundamentals, Input/ Output techniques and buses. ADC, DAC, Digital I/O, counters and timers, DMA, Software and hardware installation, Calibration, Resolution, Data acquisition interface requirements.

UNIT - IV

VI CHASSIS REQUIREMENTS. Common Instrument Interfaces: Current loop, RS 232C/ RS485, GPIB. - Bus Interfaces: USB, PCMCIA, VXI, SCSI, PCI, PXI, Firewire. PXI system controllers, Ethernet control of PXI.

UNIT - V

Networking basics for office & Industrial applications, VISA and IVI. - VI toolsets, Distributed I/O modules. Application of Virtual Instrumentation: Instrument Control, Development of process database management system

TEXT BOOK

Gary Johnson, LabVIEW Graphical Programming, 2nd edition,McGraw Hill,Newyork, 1997.

REFERENCES

1. Lisa K. wells & Jeffrey Travis, LabVIEW for everyone, Prentice Hall, New Jersey, 1997
2. Kevin James, PC Interfacing and Data Acquisition: Techniques for Measurement, Instrumentation and Control, Newnes,2000.

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T225 - INSTRUMENTATION AND CONTROL IN PETRO CHEMICAL INDUSTRIES

Lecture	**: 4 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**:**	**External Marks**	**: 75**
Credits	**: 3**	**External Examination**	**: 3 Hrs**

UNIT–I

Introduction: Petroleum Exploration, production and Refining - Refining Capacity in India - Consumption of Petroleum products in India - Constituents of Crude Oil.- : P & I diagram of petroleum refinery.

UNIT–II

Atmospheric Distillation of Crude oil - Vacuum Distillation process - Thermal Conversion process - Control of Distillation Column - Temperature Control - Process control - Feed control - Reflux Control - Reboiler Control.

UNIT-III

Controls of chemical Reactors: Temperature Control, Pressure Control - Control of Dryers - Batch Dryers - Atmospheric and Vacuum; Continuous Dryers. - Control Heat Exchangers and Evaporators - variables and Degrees of freedom - Liquid to Liquid Heat Exchangers - Steam Heaters - Condensers -Reboilers and Vaporizers - Cascade Control - Feed forward Control.

UNIT-IV

Evaporators: Types of Evaporators. - Evaporators in Petroleum refinery

UNIT-V

CONTROL OF PUMPS : Centrifugal pump: On-Off level control - Pressure control - Flow control - Throttling control. Rotary pumps: On-Off pressure control.-Reciprocating Pumps: On-Off control and Throttling control.- Effluent and Water Treatment Control: Chemical Oxidation - chemical Reduction - Naturalization - Precipitation - Biological control.

TEXT BOOK

Dr. Ram Prasad, *Petroleum Refining Technology*, Khanna Publisher, 1st Edition, 2000

REFERENCES

1. Liptak B.G., *Instrumentation in Process Industries*, Chilton Book Company, 1973
2. Considine M. and Ross S.D., *Handbook of Applied Instrumentation*, McGraw Hill, 1962
3. Liptak B.G., *Instrument Engineers Handbook*, Volume II., 1989

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T224 - INSTRUMENTATION AND CONTROL IN PAPER AND PULP INDUSTRIES

Lecture	**: 4 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**:**	**External Marks**	**: 75**
Credits	**: 3**	**External Examination**	**: 3 Hrs**

UNIT - I

Role of paper in various forms in the civilised world; history of paper making; per-capita consumption of paper and board in India and in other countries. Process description in diagrammatic and functional block details; conventional and non-conventional raw materials for paper manufacture. Various grades of paper; properties of paper.

UNIT - II

Different pulping processes; importance of kraft process; continuous and batch digesters, brown stock washers, bleaching plant, chemical recovery process; paper machine operations; conversion processes. Pulping process involves various chemical processes;

UNIT - III

Impact of effluents and need for treatment and disposal. Addition and removal of water in Paper making; process water, DM water and potable water; water treatment plant. - : Cogeneration Plant for steam and power generation

UNIT - IV

Identification of various process parameters in the industry; selection of suitable measurement hardware for flow, pressure, level, temperature, density, solids, consistency, pH, ORP, conductivity. Special gauges for measurement of basis weight, moisture and caliper. Control room layout for mill operations; graphic displays; alarm management.

UNIT - V

Special applications for controls; Digester blow tank controls; digester liquor feed pump control; brown stock washer level control; stock chest level control; dissolving tank density control; white liquor classifier density control; white liquor flow control; condensate conductivity control. dryer temperature control. Basis weight control; web moisture control. - Evolution of computer applications in the industry; Review of data logging, SCADA, DDC, PLC and DCS. Computer controls for online basis weight and web moisture in modern mills.

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TEXT BOOK

Liptak, Bela G, *Instrumentation in the Processing Industries*, Chilton Publishers, 1973

REFERENCES

1. Considine, D.M, *Hand Book of Applied Instrumentation*, McGraw Hill, 1964
2. Considine D. M., *Process/Industrial Instruments and control Handbook*, McGraw Hill, 4thedition 1993. www.tappi.com
3. Robert H. Perry, Green D.W. and Maloney J.O., *Perry's Chemical Engineers'* Handbook, McGraw HillInc, New York, 7th ed, 1998

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P852 -MICROPROCESSORS AND MICROCONTROLLERS APPLICATIONS LAB.

Lecture	**: 3 Periods/week**	**Internal Marks**	**: 25**
		External Marks	**: 75**
Credits	**: 2**	**External Examination**	**: 3 Hrs**

LIST OF EXPERIMENTS:

MICROPROCESSOR 8086:

1. Introduction to MASM/TASM.

2. Arithmetic operation: – Multi byte addition & subtraction,
   Multiplication & Division,
   Signed & Unsigned arithmetic operations,
   ASCII- arithmetic operation.

3. Logic operations : - Shift & Rotate.
   Converting packed BCD to Unpacked BCD
   BCD to ASCII conversion.

4. By using string operations & Instruction prefix:- Move block of data,
   Reverse String, Sorting Inserting,
   Deleting string, Length of string,
   String comparison.

5. DOS/BIOS programming: - Reading key board
   (Buffered with & without echo),
   Display characters & Strings.

INTERFACING:

1. 8259-Interrupt controller: Generate a interrupt using 8259 Timer.
2. 8279-Keyboard display: Write a small program to display a string of characters.
3. 8255-PPI:Write ALP to generate sinusoidal wave using PPI.
4. 8251-USART:Write a program in ALP to establish communication between two processors.

MICROCONTROLLER 8051:

1. Reading & writing on a parallel port.
2. Timer in different modes.
3. Serial communication implementation.

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P840 : INSTRUMENTATION – II LAB.

Lecture	**: 3 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**:**	**External Marks**	**: 75**
Credits	**: 2**	**External Examination**	**: 3 Hrs**

LIST OF EXPERIMENTS:

1. Design & simulation of Analog circuits using CAD package.
2. Design of PCB's using packages & Fabrication of PCB.
3. Linearization of Thermistor using Microprocessor.
4. Study of level control using PLC.
5. PH measurement.
6. Measurement of Blood pressure.
7. Calibration of P/I & I/P converters.
8. RPM indicator using Stroboscope.
9. Measurement of Humidity.
10. Measurement of Velocity of liquid using Ultrasonic method & also Flow measurement.
11. Measurement of Level using Capacitance method.
12. Displacement measurement using Inductive pickup & Capacitive pickup.
13. PID controller setup.

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T272 – OPTO ELECTRONICS AND LASER INSTRUMENTATION

Lecture	**: 4 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**: 1**	**External Marks**	**: 75**
Credits	**: 4**	**External Examination**	**: 3 Hrs**

UNIT - I

OPTICAL FIBERS AND THEIR PROPERTIES
Introduction to optical fibers – Light guidance – Numerical aperture – Dispersion – Different types of fibers and their properties. - Light Sources for fiber optics, Photo detectors, source coupling, splicing and connectors.

UNIT - II

LASER FUNDAMENTALS: Laser configuration – Q-Switching – Mode locking – Different types of Lasers – Ruby, Nd-Yag, He-Ne, CO2, Orgon ion.

UNIT - III

FIBER OPTIC SENSORS : IR sources and detectors – Interferometer method of measurement of length – Moire fringes – Measurement of pressure, Temperature, Current, Voltage, Liquid level and strain - fiber optic Gyroscope – Polarization maintaining fibbers – Applications.
OPTO-ELECTRONIC COMPONENTS: LED, LD, PIN & APD, and Electro-optic, Magneto optic and Acousto-optic Modulators

UNIT - IV

LASER INSTRUMENTATION: Industrial applications of lasers – Bio-medical application – Laser Doppler velocity meter – Laser heating - HOLOGRAPHY: Principle, Methods, Holographic Interferometers and applications.

UNIT - V

MEDICAL APPLICATIONS: Lasers and tissue interaction, Laser instruments for surgery, removal tumors of vocal cords, plastic surgery, DERMATOLOGY.

TEXT BOOK

An Introduction to Optical fibers.- Allen H.C. McGraw Hill, Singapore, 1993

REFERENCES

1. Optics – A.K. Ghatak, Second edition, Tata McGraw Hill, New Delhi,1992.
2. Lasers : Theory and Applications – by Thyagarajan K. and Ghatak A.K., Plenum Press, New York.
3. Lasers and Optical Engineering – by Das P., Springers International Students Edition, 1991.
4. Optical Electronics – by Ghatak A.K. and Thyagarajan K., Foundation Books, 1991.
5. Laser and Applications – by Guimarass W.O.N. and Mooradian A., Springer Verlag, 1981.

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T273 – PC BASED INSTRUMENTATION

Lecture	**: 4 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**:**	**External Marks**	**: 75**
Credits	**: 4**	**External Examination**	**: 3 Hrs**

UNIT - I

Introduction to PC based instrumentation, PC, I/O Ports , Plug-in Ports, O/P systems with actuators, operating interface, operating system, PC expansion systems ,Back-plane Bus.

UNIT - II

PC Programming-ALP, Data transfer operations, Sealing & Linearization.

UNIT - III

PLC's-Definition, Overview, PLC block diagram, I/O modules, Power supplies. Ladder logics-Definition, Creating Ladder diagrams, PLC functions, Registers, Timer, Counters.

UNIT - IV

PLC Intermediate functions-Arithmetic functions, Comparison functions, Skip & MCR functions, Sequencer functions.

UNIT - V

PLC Installation- Maintenance, Trouble shooting, PLC-PID functions, Ladder languages, Field bus, Pro field bus, Industrial field bus, Smart sensors, Hart protocols.

TEXT BOOK

Computer control of process - by m.chidambaram. – narosa publihsers

REFERENCES

1. Computer control of process – k.krishna kanth.
2. PC based instrumentation concepts and practice–by n.Mathivanan - phi

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T115 – ANALYTICAL INSTRUMENTATION

Lecture	**: 4 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**: 1**	**External Marks**	**: 75**
Credits	**: 4**	**External Examination**	**: 3 Hrs**

UNIT - I

ELECTRO-CHEMICAL INSTRUMENTS & PH MEASURING SYSTEMS - Introduction to AI-Objectives-Electro-chemical cell, construction-potentiometers. conductivity meters-construction-measurement of conductance. polarographs-types of electrodes-instrumentation. - Principles of PH measuring electrodes, measuring-reference-selective ion type measuring circuits, industrial PH-meters

UNIT - II

SPECTRO PHOTOMETERS : Spectral methods of analysis - Beer's law UV - visible spectrophotometers - single beam and double beam instruments - source and detectors - IR spectrophotometers - sources and detectors - FTIR spectrometers - atomic absorption spectrophotometer - flame emission spectrophotometers - sources of flame photometry - applications

UNIT - III

GAS ANALYSER & CHROMATOGRAPHY - Oxygen analyser - CO monitor - Nox analyser - H2S analyser - dust and smoke measurement- thermal conductivity type - thermal analyser - industrial analysers. - Gas chromatography - liquid chromatography - principles, types and applications - high-pressure liquid chromatography - detectors

UNIT - IV

NUCLEAR MAGNETIC RESONANCE AND RADIATION TECHNIQUES NMR - basic principle - NMR spectrometers - applications - introduction to mass spectrophotometers - nuclear radiation detectors - GM counter - proportional counter - solid state detectors - introduction - to x-ray spectroscopy.

UNIT - V

ENVIRONMENTAL POLLUTION MONITORING INSTRUMENTS:Air pollution monitoring, instrument systems for-carbon monoxide-sulpher dioxide-nitrozen oxides-hydro carbons-ozone automated wet chemical analyzerswater pollution monitoring.

TEXT BOOK

Willard H.H., Merrit L.L. , Dean J.A., Scattle F.I. – Instrumental methods of Analysis, 7th Edn., CBS, 1986

REFERENCES

1. Skoog D.A. – Principles of Instrumental Analysis, Holt Soundes publications, 4th Edn., 1982
2. Man R.S.Khandpur – Handbook of Analytical Instruments, TMH 1989
C.K., Vicker T.J. & Gullick W.H. – Instrumental Analysis, Harper and Row Publishers.

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T338 –VLSI DESIGN

Lecture	**: 4 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**: 1**	**External Marks**	**: 75**
Credits	**: 4**	**External Examination**	**: 3 Hrs**

UNIT –I

IC TECHNOLOGY

MOS, PMOS, NMOS, CMOS & BiCMOS technologies, Photolithography and Pattern Transfers , Basic Electrical Properties of MOS and CMOS Circuits: Ids-Vds relationships, MOS transistor threshold Voltage, gm, gds, figure of merit ; Pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter analysis and design.

UNIT-II

VLSI CIRCUIT DESIGN PROCESSES

VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layout, 2 micro meter CMOS Design rules for wires, Contacts and Transistors Layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits, NAND and NOR Gates – Complex Logic Gates.

UNIT -II

CMOS Logic Gates Design and Layout

Basic circuit concepts, Sheet Resistance RS and its concept to MOS, Area Capacitance Units, Calculations of Delays, Driving large Capacitive Loads, Wiring Capacitances, Alternate gate circuits, Tri state circuits, Transmission Gate and Pass Transistor Logic.

UNIT-IV

SUBSYSTEM DESIGN

Subsystem Design,4-by-4 barrel Shifters, carry look ahead Adder, ALUs, 4x4 array Multipliers, Parity generators, Comparators, Zero/One Detectors, binary Counters, Memory Elements: SRAM,DRAM,basic ROM.

UNIT-V

VHDL SYNTHESIS

VHDL Synthesis, Circuit Design Flow, Circuit Synthesis, Simulation, Layout, Design capture tools, Design Verification Tools, need for testing, manufacturing test principles:D-algoritham .

TEXTBOOK :

1. Essentials of VLSI circuits and systems – Kamran Eshraghian, Eshraghian Dougles and A. Pucknell, PHI, 2005 Edition.

REFERENCES :

1. Chip Design for Submicron VLSI: CMOS Layout & Simulation, - John P. Uyemura, Thomson Learning.
2. Principles of CMOS VLSI Design - Weste and Eshraghian, Pearson Education, 1999.
3. Modern VLSI Design - Wayne Wolf, Pearson Education, 3rd Edition, 1997.

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T163 – DIGITAL SIGNAL PROCESSING

Lecture	**: 4 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**: 1**	**External Marks**	**: 75**
Credits	**: 4**	**External Examination**	**: 3 Hrs**

OBJECTIVE

To introduce the concept of DFT and its computation.To study the properties of DFS and FFS. To study the Z-transforms and its applications.To understand the basic structures of IIR and FIR systems. This course will help to understand the design techniques for digital filters.

UNIT - I

Introduction to Digital Signal Processing
Discrete time signals & sequences, linear shift invariant systems, stability, and causality. Linear constant coefficient difference equations. Frequency domain representation of discrete time signals and systems. Introduction to Digitals and Signals.

UNIT - II

Discrete Fourier series
Properties of discrete Fourier series, DFS representation of periodic sequences, Discrete Fourier transforms: Properties of DFT, linear convolution of sequences using DFT, Computation of DFT. FAST FOURIER TRANSFORMS:Fast Fourier transforms (FFT) - Radix-2 decimation in time and decimation in frequency FFT Algorithms, Inverse FFT, and FFT for composite N.

UNIT - III

Realization of Digital Filters
Review of Z-transforms, Applications of Z – transforms, Relation between Z-transform and DFS solution of difference equations of digital filters, Block diagram representation of linear constant-coefficient difference equations, Basic structures of IIR systems, Transposed forms, Basic structures of FIR systems, System function, MULTIRATE DIGITAL SIGNAL PROCESSING Introduction to Decimation, interpolation, sampling rate conversion, Implementation of sampling rate conversion.

UNIT - IV

FIR& IIR Digital Filters:
Characteristics of FIR Digital Filters, frequency response. Design of FIR Digital Filters using Window Techniques, Frequency Sampling technique, Comparison of IIR & FIR filters.Analog filter approximations – Butter worth and Chebyshev, Design of IIR Digital filters from analog filters, Design Examples: Analog-Digital transformations.

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UNIT - V

Architecture of TMS320XXX
Introduction to programmable DSPs: Multiplier and Multiplier Accumulator (MAC), Modified Bus Structures and Memory Access schemes in DSPs Multiple access memory, multiport memory, VLSI Architecture, Pipelining, Special addressing modes, On-Chip Peripherals.
Introduction –Architectural overview – Memory and I/O spaces -Internal architecture – Central Processing Unit (CPU) – Program control.
Addressing Modes and Assembly Language Instructions of C2xxx
Data formats – Addressing modes – groups of addressing mode – Assembly language instructions

TEXT BOOK

Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis, Dimitris G. Manolakis, Pearson Education / PHI, 2007

REFERENCES

1. Discrete Time Signal Processing – A.V.Oppenheim and R.W. Schaffer, PHI
2. Digital Signal Processing: Andreas Antoniou, TATA McGraw Hill , 2006
3. Digital Signal Processing: MH Hayes, Schaum's Outlines, TATA Mc-Graw Hill, 2007.
4. DSP Primer - C. Britton Rorabaugh, Tata McGraw Hill, 2005.
5. Fundamentals of Digital Signal Processing using Matlab – Robert J. Schilling, Sandra L.Harris, Thomson, 2007.
6. Fundanentals of DSP by Lonnie – C LUDEMAN by john willey & sons

LBRCE EXAMINATION SECTION

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T262 – NEURAL NETWORKS AND FUZZY LOGIC

Lecture	: 4 Periods/week	Internal Marks	: 25
Tutorial	: 1	External Marks	: 75
Credits	: 3	External Examination	: 3 Hrs

OBJECTIVE

This course introduces the basics of neural networks and essentials of artificial neural networks with single layer and multilayer feed forward networks. Also deals with associate memories and introduces fuzzy sets and fuzzy logic system components. The neural networks and fuzzy network systems application to electrical engineering is also presented. This subject is very important and useful for doing project work.

UNIT - I

Introduction to Neural Networks

Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Characteristics of ANN, McCulloch-Pitts Model, Historical Developments, Potential Applications of ANN.

UNIT - II

Artificial Neural Networks

Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN – Connectivity, Neural Dynamics (Activation and Synaptic), Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules, Types of Application.

UNIT - III

Feed Forward Neural Networks

Introduction, Perceptron Models:Perceptron Convergence theorem, Limitations of the Perceptron Model.Generalized Delta Rule, Derivation of Back propagation (BP) Training, Kolmogorov Theorem, Learning Difficulties and Improvements.

Associative Memories

Hebbian Learning, Bidirectional Associative Memory (BAM) Architecture and training algorithms. Architecture of Hopfield Network ,Stability Analysis.

UNIT - IV

Fuzzy Logic- I

Introduction to Fuzzy sets & classical sets - properties, Operations,relations and cardinalities, Fuzzy membership functions- different types.

Fuzzification, Membership value assignment, development of rule base and Implication methods.

UNIT - V

Fuzzy Logic- II

Defuzzification methods. Defuzzification to crisp sets. Hard C-means and Fuzzy C-means.

Fuzzy logic applications: Fuzzy classification, Fuzzy logic control and fuzzy decision making.

TEXT BOOKS

1. Neural Networks – James A Freeman and Davis Skapura, Pearson Education, 2002.
2. Neural Networks – Simon Hakins, Pearson Education

T122 – ARTIFICIAL INTELLIGENCE

Lecture	: 4 Periods/week	Internal Marks	: 25
Tutorial	: 1	External Marks	: 75
Credits	: 4	External Examination	: 3 Hrs

UNIT - I

Introduction: Overview of Artificial intelligence- Problems of AI, AI technique, Tic - Tac - Toe problem.
Intelligent Agents: Agents & environment, nature of environment, structure of agents, goal based agents, utility based agents, learning agents.
Problem Solving: Problems, Problem Space & search: Defining the problem as state space search, production system, problem characteristics, and issues in the design of search programs.

UNIT - II

Search techniques: Solving problems by searching: problem solving agents, searching for solutions; uniform search strategies: breadth first search, depth first search, depth limited search, bi-directional search, comparing uniform search strategies.
Heuristic search strategies: Greedy best-first search, A* search, memory bounded heuristic search, local search algorithms &optimization problems, Hill climbing search, simulated annealing search, local beam search, genetic algorithms, constraint satisfaction problems, local search for constraint satisfaction problems.

UNIT - III

Knowledge: Knowledge representation issues, representation & mapping, approaches to knowledge representation, issues in knowledge representation.
Using predicate logic: Representing simple fact in logic, representing instant & ISA relationship, computable functions &predicates, resolution, natural deduction.

UNIT - IV

Representing knowledge using rules: Procedural verses declarative knowledge, logic programming, forward verses backward reasoning, matching, control knowledge.

UNIT - V

Reasoning: Probabilistic reasoning: Representing knowledge in an uncertain domain, the semantics of Bayesian networks, Dempster-Shafertheory, Fuzzy sets & fuzzy logics.

TEXT BOOK

Artificial Intelligence, Ritch & Knight, TMH

REFERENCES

1. Artificial Intelligence A Modern Approach, Stuart Russell & Peter Norvig Pearson
2. Introduction to Artificial Intelligence & Expert Systems, Patterson, PHI
3. Artificial Intelligence A new Synthesis, Neil J. Nilsson, Morgan Kaufman
4. Artificial Intelligence, John. F. Lugar, Pearson Ed.
5. Artificial Intelligence, Winston, Pearson Ed

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LBRCE EXAMINATION SECTION

T252 – MICRO ELECTRO MECHANICAL SYSTEMS (MEMS)

Lecture	**: 4 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**:**	**External Marks**	**: 75**
Credits	**: 3**	**External Examination**	**: 3 Hrs**

UNIT - I

Overview of MEMS

MEMS and Microsystems definitions and examples, Difference between Microsystems and Microelectronics, Benefits of miniaturization,Applications: Industrial/automotives sensors, Medical systems, aircraft sensors, Structural health monitoring, Telecommunication etc, Materials for MEMS.

UNIT - II

SCALING LAWS IN MINIATURIZATION

Introduction to Scaling, Scaling in Geometry, Scaling in Electrostatic forces. MEMS Design Considerations.

UNIT - III

MICRO FABRICATION -I

Introduction, Photolithography, Photoresists and Application, Light Sources, Photoresist Removal, Ion Implantation, Diffusion, Oxidation, Chemical Vapor Deposition (CVD), Sputtering, Deposition by Epitaxy, Etching.

UNIT - IV

MICRO FABRICATION - II

Bulk Micromachining: Etching-Isotropic and Anisotropic, Wet Etching and Dry Etching (Plasma, Deep reactive ion) Comparison.

Surface Micromachining: Process, associated Mechanical problems (Adhesion, Interfacial stresses, Stiction), LIGA process, MEMS Packaging.

UNIT - V

MEMS DEVICES AND STRUCTURES

Microsensors: Biomedical Sensors, Chemical sensors, Optical Sensors, Pressure Sensors, Thermal Sensors.

Microactuation: Actuation using thermal forces, Piezolelctric crystals, Electrostatic forces, MEMS with microactuators: Microgrippers, Micromotors, Microgears, Micropumps.

TEXT BOOK

1. Tai-Ran Hsu, MEMS & Microsystems Design and Manufacture, Tata McGraw Hill.

REFERENCES

1. Fundamentals of Micro Fabrication, Marc Madou, CRC Press
2. The MEMS Handbook, Mohamed Gad-el-Hak, CRC Press
3. Micro and Smart Systems, G.K.Anantha Suresh, Wiley India

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T161 – DIGITAL IMAGE PROCESSING

Lecture	**: 4 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**:**	**External Marks**	**: 75**
Credits	**: 3**	**External Examination**	**: 3 Hrs**

UNIT - I

DIGITAL IMAGE PROCESSING: Fundamental & Applications of Image Processing, Fundamental Steps & Components of an Image Processing System, Concept of gray levels, Gray level to binary image conversion, Sampling and quantization, Relationship between pixels ,Imaging Geometry.

UNIT - II

IMAGE TRANSFORMATION: 2-D FFT , Properties. Walsh transform, Hadamard Transform, Discrete cosine Transform, Haar transform, Slant transform, KL Transform.

UNIT - III

IMAGE ENHANCEMENT IN SPIATIAL,FREQUENCY DOMAIN : Spatial domain Enhancement, Point processing , Gray Level Transformations, Histogram Processing, Smoothing Spatial Filters & Sharpening Spatial Filters, Frequency domain Enhancement, Smoothing Frequency Domain Filters & Sharpening Frequency Domain Filters, Laplacian in the Frequency Domain, Image Restoration Degradation model, Noise Models, Restoration in the Presence of Noise Only–Spatial Filtering, Mean Filters ,Least mean square filters, Order-Statistics Filters, Constrained Least Squares Restoration.

UNIT - IV

IMAGE SEGMENTATION &IMAGE COMPRESSION : Image segmentation: Detection of discontinuities, Thresholding, Region oriented segmentation, Edge Linking and Boundary Detection, Local Processing, Global Processing via the Hough Transform& Graph-Theoretic Techniques, Thresholding, The Role of Illumination, Basic Global Thresholding, Basic Adaptive Thresholding, Region-Based Segmentation, Region Growing, Region Splitting and Merging,

Image compression: Introduction, Image compression Redundancies and their removal methods, Image Compression Models, The Source Encoder and Decoder, The Channel Encoder and Decoder, Error-Free Compression, Lossy Compression.

UNIT - V

COLOR IMAGE PROCESSING: Introduction, Color Models, Pseudocolor Image Processing, Intensity Slicing , Gray Level to Color Transformations, Basics of Full-Color Image Processing, Color Transformation, Histogram Processing.

TEXT BOOK

Digital Image processing – R.C. Gonzalez & R.E. Woods, Addison Wesley/ Pearson education,3nd Education, 2002.

REFERENCES

Fundamentals of Digital Image processing – A.K.Jain , PHI

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REFERENCES

1. Image Processing, Analysis, and Machine Vision, Milan Sonka, Vaclav Hlavac and Roger Boyle, Second Edition, Thomson Learning.
2. Introduction to Digital Image Processing with Matlab, Alasdair McAndrew, Thomson Course Technology
3. Computer Vision and Image Processing, Adrian Low, Second Edition, B.S.Publications
4. Digital Image Processing, William K. Prat, Wily Third Edition

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P820 – DIGITAL SIGNAL PROCESSING LAB.

Lab.	**: 3 Periods/week**	**Internal Marks**	**: 25**
		External Marks	**: 75**
Credits	**: 2**	**External Examination**	**: 3 Hrs**

LIST OF EXPERIMENTS

USING TMS320C5X:

1. Generation of Signals
2. Linear Convolution
3. Implementation of a FIR filter
4. Implementation of an IIR filter
5. Calculation of FFT

USING MATLAB:

1. Generation of Discrete time Signals
2. Verification of Sampling Theorem
3. FFT and IFFT
4. time & Frequency response of LTI systems
5. Linear and Circular Convolution through FFT
6. Design of FIR filters (window design)
7. Design of IIR filters (Butterworth &Chebychev)

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P841 – INSTRUMENTATION – III LAB.

Lab.	**: 3 Periods/week**	**Internal Marks**	**: 25**
		External Marks	**: 75**
Credits	**: 2**	**External Examination**	**: 3 Hrs**

LIST OF EXPERIMENTS:

1. Gas analyzer.
2. Gas & Liquid chromatography.
3. UV & VIS Spectrometer.
4. IR & FTIR Spectrometer.
5. Flame photometer.
6. Measurement of calorific value.
7. Mass Spectrometer.
8. Interfacing of ADC to PC.
9. Interfacing of DAC to PC & generate various types of signals.
10. Serial communication through RS232C between PCs.
11. GPIB interface-Master to slave data transfer.
12. GPIB interface-Slave to slave data transfer.
13. Data transfer through IEEE-1394 interface.

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VIII-SEMESTER

T218 – INDUSTRIAL ELECTRONICS

Lecture	**: 3 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**:**	**External Marks**	**: 75**
Credits	**: 4**	**External Examination**	**: 3 Hrs**

UNIT - I

DC AMPLIFIERS: Need for DC amplifiers, DC amplifiers—Drift, Causes, Darlington Emitter Follower, Cascode amplifier, Stabilization, Differential amplifiers—Chopper stabilization, Operational Amplifiers, Ideal specifications of Operational Amplifiers, Instrumentation Amplifiers.

UNIT - II

REGULATED POWER SUPPLIES: Block diagram, Principle of voltage regulation, Series and Shunt type Linear Voltage Regulators, Protection Techniques— Short Circuit, Over voltage and Thermal Protection.

UNIT - III

SCR AND THYRISTOR: Principle of operation and characteristics of SCR, Methods of Turn on and turn off mechanism, Gate characteristics , Ratings of SCR -Triggering of SCR, Diac and Triac Phase controlled half and full wave rectification.

UNIT - IV

INDUSTRIAL APPLICATIONS – I : Industrial timers -Classification, types, Electronic Timers – Classification, RC and Digital timers, Time base Generators. Electric Welding – Classification, types and methods of Resistance and ARC wielding, Electronic DC Motor Control.

UNIT - V

INDUSTRIAL APPLICATIONS – II : High Frequency heating – principle, merits, applications, High frequency Source for Induction heating. Dielectric Heating – principle, material properties, Electrodes and their Coupling to RF generator, Thermal losses and Applications.Ultrasonics – Generation and Applications.

TEXT BOOK

GK Mithal & Dr Maneesha Gupta, Industrial & Power Electronics, 19th Edn., Kanna Publications, 2003

REFERENCES

1. Integrated Electronics – J. Millman and C.C Halkias, McGraw Hill, 1972.
2. Electronic Devices and circuits – Theodore.H.Bogart, Pearson Education,6th Edn., 2003.
3. Thyristors and applications – M. Rammurthy, East-West Press, 1977.

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T243 – MANAGEMENT INFORMATION SYSTEMS

Lecture	**: 3 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**:**	**External Marks**	**: 75**
Credits	**: 3**	**External Examination**	**: 3 Hrs**

UNIT - I

Information systems in the enterprise: Why information systems, perspectives on information systems, contemporary approaches to information systems, - Four major types of systems in organizations, transaction processing systems, management information systems, decision support systems, executive support systems. - Systems from a functional perspective- Sales and Marketing Systems, Manufacturing and Production Systems, Financial and Accounting Systems, Human Resources Systems.

UNIT - II

The Digital Firm, Electronic Business and Electronic Commerce: Internet technology and the digital firm, categories of electronic commerce, customer centered retailing, business-to-business electronic commerce, commerce payments, electronic business, management opportunities, challenges and solutions.

UNIT - III

The wireless revolution: importance of wireless networking, wireless transmission media and devices, cellular network standards and generations, wireless computer networks and internet access, wireless technology in the enterprise. - Security and control: system vulnerability and abuse, importance of security and control, establishing a management framework for security and control, technologies and tools for security and control

UNIT - IV

Enterprise Applications and Business Process Systems: What are enterprise systems, how enterprise systems work, supply chain management systems, customer relationship management systems, and enterprise integration trends?

UNIT - V

Redesigning the organizations with information systems: systems as planned organizational change, overview of system development, - Alternative systems building approaches – traditional systems life cycle, prototyping, end user development, application software package and outsourcing. - Managing change and international information systems: The importance of change management in information systems success and failure, managing implementation, managing global systems, technology issues and opportunities for global value chains.

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TEXT BOOK

Management Information Systems Kenneth - C. Laudon, Jane P. Laudon & VM Prasad, 9/e, Pearson Education, 2005.

REFERENCES

1. Management Information Systems - Effy Oz, Third Edition, Thomson, 2002.
2. Information Technology-Strategic Decision Making for Managers - M Henry C.Lucas, Jr., John Wiley & Sons, Inc, 2005.
3. Introduction to Information Systems, - James A. O'Brien, TMH, New Delhi, 2002.4. Information Systems Today - Jessup &Velacich, PHI, 2004.5. Management Information Systems - Sadagopan, PHI, 2004.6. Information Systems, Pearson Education - Steven Alter, Fourth Edition, 2004.7. Information Technology, - Turban, Rainer, Potter, John Wiley, 2003.8. Management Information Systems - W S Jawadekar, TMH, Second Edition, 2002.

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T190 – EMBEDDED SYSTEMS DESIGN

Lecture	**: 3 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**:**	**External Marks**	**: 75**
Credits	**: 3**	**External Examination**	**: 3 Hrs**

OBJECTIVE

This subject deals with the Fundamentals of Embedded systems, information about Devices and Buses for Devices network. In addition to the fundamentals, embedded programming and Real time operating systems are also discussed.

UNIT - I

EMBEDDED SYSTEM INTRODUCTION: Embedded systems overview, design challenge, processor technology, IC technology, Design Technology, Trade-offs. Single purpose processors RT-level combinational logic, sequential logic (RTlevel), custom single purpose processor design (RT-level), optimizing custom single purpose processors.

UNIT - II

STATE MACHINE AND CONCURRENT PROCESS MODELS : Introduction, models Vs. languages, finite state machines with data path model (FSMD), using state machines, program state machine model (PSM), concurrent process model, concurrent processes, communication among processes, synchronization among processes, Implementation, data flow model, real-time systems.

UNIT - III

EMBEDDED / RTOS CONCEPTS : Architecture of the Kernel, Tasks and Task scheduler, Interrupt service routines, Semaphores, Mutex,Mailboxes , Message Queues, Event Registers, Pipes, Signals, Timers, Memory Management, Priority inversion problem, Embedded operating systems Embedded Linux, Real-time operating systems, RT Linux, Handheld operating systems, Windows CE.

UNIT - IV

HARDWARE–SOFTWARE CO-DESIGN IN AN EMBEDDED SYSTEM: Embedded System Project Management Embedded System Design and Co-Design Issues in System Development Process.

UNIT - V

DESIGN CYCLE IN THE DEVELOPMENT PHASE FOR AN EMBEDDED SYSTEM: Use of Target Systems, use of Software Tools for Development of an Embedded System, use of Scopes and Logic Analysis for System, Hardware Tests. Issues in Embedded System Design.

TEXT BOOK

Embedded System Design – A Unified Hardware/Software Introduction - Frank Vahid, Tony D. Givargis,John Wiley, 2002.

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REFERENCES

1. An Embedded Software Primer – David E. Simon, Pearson Ed., 2005.
2. Embedded / Real Time Systems – KVKK Prasad, Dreamtech Press, 2005.
3. Microcontrollers Architecture, Programming,

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T322 – TELEMETRY AND TELE CONTROL

Lecture	**: 3 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**:**	**External Marks**	**: 75**
Credits	**: 3**	**External Examination**	**: 3 Hrs**

UNIT - I

TELEMETRY PRINCIPLES : Introduction, Functional blocks of Telemetry system, Methods of Telemetry – Non Electrical, Electrical, Pneumatic, Frequency, Power Line Carrier Communication .

UNIT - II

SYMBOLS AND CODES
Bits and Symbols, Time function pulses, Line and Channel Coding, Modulation Codes. Intersymbol Interference.

UNIT - III

FREQUENCY DIVISION MULTIPLXED SYSTEMS : FDM, IRIG Standard, FM and PM Circuits, Receiving end, PLL - **TIME DIVISION MULTIPLXED SYSTEMS :** TDM-PAM, PAM /PM and TDM – PCM Systems. PCM reception. Differential PCM.Introduction, QAM, Protocols.

UNIT - IV

SATELLITE & OPTICAL TELEMETRY
General considerations, TT&C Service, Digital Transmission systems, TT&C Subsystems, Telemetry and Communications. - Optical fibers Cable – Sources and detectors – Transmitter and Receiving Circuits, Coherent Optical Fiber Communication System.

UNIT - V

TELECONTROL METHODS : Analog and Digital techniques in Telecontrol, Telecontrol apparatus – Remote adjustment, Guidance and regulation – Telecontrol using information theory – Example of a Telecontrol System.

TEXT BOOK

Telemetry Principles – D. Patranabis, TMH

REFERENCES

1. Handbook of Telemetry and Remote Control – by Gruenberg L., McGraw Hill, New York, 1987.
2. Telecontrol Methods and Applications of Telemetry and Remote Control – by Swoboda G., Reinhold Publishing Corp., London, 1991
3. Telemetry Engineering – by Young R.E., Little Books Ltd., London, 1988.
4. Data Communication and Teleprocessing System – by Housley T., PH Intl., Englewood Cliffs, New Jersey, 1987.

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T106 – ADVANCED SENSORS

Lecture	**: 3 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**:**	**External Marks**	**: 75**
Credits	**: 3**	**External Examination**	**: 3 Hrs**

UNIT - I

SEMICONDUCTOR SENSORS: Metal Oxide Semiconductors, Hall Elements, Silicon Sensors, Silicon plannar technology, Micromachine technology, silicon sensors for sensing radiation, mechanical, magnetic, chemical and other signals, IC sensors.

UNIT - II

CHEMICAL AND BIOMEDICAL SENSORS: Polymers, chemically modified electrodes, Membrane electrodes, Thick Film Devices, catalytic devices, Gas sensors.
OPTICAL SENSORS: Lasers, photo-detectors and optical fibre as sensors, Integrated optics

UNIT - III

MICRO SENSORS: Thin film sensors, Micro sensors for sensing thermal Radiation, Mechanical, Magnetic and Chemical signals.

UNIT - IV

INTERFACING AND SIGNAL PROCESSING: Intelligent and smart sensors, concepts of redundant and multi – sensory systems, operation in coded mode and mapping mode.

UNIT - V

SMART SENSORS : Basics of smart sensors, salient features of smart sensors, various components in smart sensors, TEDS, IEEE-1451 standards.

TEXT BOOK

Middle Hock S and Andel SA – Silicon Sensors, Academic Press, London, 1989

REFERENCES

1. Chemical Sensors Edmonds TE - , Blackie London 1988
2. Patranabis D – Sensors and Transducers, Wheeler Publishing

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T159 – DIGITAL CONTROL SYSTEMS

Lecture	**: 3 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**:**	**External Marks**	**: 75**
Credits	**: 3**	**External Examination**	**: 3 Hrs**

UNIT - I

SAMPLING AND RECONSTRUCTION :
Introduction, Examples of Data control systems – Digital to Analog conversion and Analog to Digital conversion, sample and hold operations.

UNIT - II

Z-PLANE ANALYSIS OF DISCRETE-TIME CONTROL SYSTEM :
Z-Transform method for solving difference equations; Pulse transforms function, block diagram analysis of sampled – data systems, mapping between s-plane and z-plane.

UNIT - III

STATE SPACE ANALYSIS :
State Space Representation of discrete time systems, Pulse Transfer Function Matrix solving discrete time state space equations, State transition matrix and it's Properties, Methods for Computation of State Transition Matrix, Discretization of continuous time state – space equations

UNIT - IV

CONTROLLABILITY AND OBSERVABILITY :
Concepts of Controllability and Observability, Tests for controllability and Observability. Duality between Controllability and Observability, Controllability and Observability conditions for Pulse Transfer Function - **STABILITY ANALYSI :** Mapping between the S-Plane and the Z-Plane – Primary strips and Complementary Strips – Constant frequency loci, Constant damping ratio loci, Stability Analysis of closed loop systems in the Z-Plane. Jury stablility test – Stability Analysis by use of the Bilinear Transformation and Routh Stability criterion.

UNIT - V

STATE FEEDBACK CONTROLLERS AND OBSERVERS :
Design of state feedback controller through pole placement – Necessary and sufficient conditions, Ackerman's formula.- State Observers – Full order and Reduced order observers.

TEXT BOOK

Discrete-Time Control systems - K. Ogata, Pearson Education/PHI, 2nd Edition

REFERENCES

1. Digital Control and State Variable Methods by M.Gopal, TMH
2. Digital Control Systems, Kuo, Oxford University Press, 2nd Edition, 2003.
3. Digital Control Engineering, M.Gopal

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T169 – DSP PROCESSORS AND ARCHITECTURES

Lecture	**: 3 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**:**	**External Marks**	**: 75**
Credits	**: 3**	**External Examination**	**: 3 Hrs**

UNIT - I

INTORODUCTION TO DIGITAL SIGNAL PROCESING: Introduction, A Digital signal-processing system, TheSampling process, discrete time sequences. Discrete Fourier Transform (DFT) and Fast Fourier Transform(FFT), Linear time-invariant systems, Digital filters, Decimation and interpolation,

UNIT - II

COMPUTATIONAL ACCURACY IN DSP IMPLEMENTATIONS: Number formats for signals and coefficientsin DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/D Conversionerrors, DSP Computational errors, D/A Conversion Errors, Compensating filter.

UNIT - III

ARCHITECTURES FOR PROGRAMMABLE DSP DEVICES: Basic Architectural features, DSPComputational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address
Generation Unit, Programmability and Program Execution, Speed Issues, Features for External interfacing.
EXECUTION CONTROL AND PIPELINING: Hardware looping, Interrupts, Stacks, Relative Branch supportPipelining and Performance, Pipeline Depth, Interlocking, Branching effects, Interrupt effects, PipelineProgramming models.

UNIT - IV

PROGRAMMABLE DIGITAL SIGNAL PROCESSORS: Commercial Digital signal-processing Devices, DataAddressing modes of TMS320C54XX DSPs, Data Addressing modes of TMS320C54XX Processors, Memoryspace of TMS320C54XX Processors, Program Control, TMS320C54XX instructions and Programming, On-Chip Peripherals, Interrupts of TMS320C54XX processors, Pipeline Operation of TMS320C54XX Processors.

UNIT - V

IMPLEMENTATION OF FFT ALGORITHMS: An FFT Algorithm for DFT Computation, A ButterflyComputation, Overflow and scaling, Bit-Reversed index generation, an 8-Point FFT implementation on the TMS320C54XX,

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TEXT BOOKS

1. Digital Signal Processing – Avtar Singh and S. Srinivasan, Thomson Publications, 2004.
2. DSP Processor Fundamentals, Architectures & Features – Lapsley et al. S. Chand & Co, 2000.

REFERENCES

1. DSP Processor Fundamentals, Architectures & Features – Lapsleyet al. S. Chand & Co, 2000
2. Digital Signal Processors, Architecture, Programming andApplications – B. Venkata Ramani and M.Bhaskar, TMH, 2004.
3. Digital Signal Processing – Jonatham Stein, John Wiley, 2005.

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T300 – ROBOTICS

Lecture	**: 3 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**:**	**External Marks**	**: 75**
Credits	**: 3**	**External Examination**	**: 3 Hrs**

UNIT-I

Introduction : Basic concepts – Robot anatomy –Components of robots- Robot motions – Number of D.O.F – Work volume – Robot drive systems – Classification of robots by control method – Specifications of robots..
End Effectors: Introduction – Types of end effectors – Mechanical grippers – Vacuum cups, magnetic grippers, adhesive gripers and others – Robot / End effectors interface – Considerations in gripper selection and design

UNIT-II

Manipulator Kinematics: Introduction – The direct kinematics problem: Rotation matrices, composite rotation matrix about on arbitrary axis , rotation matrix with euler angle representation – Geometric interpretation of rotation matrices, homogeneous coordinates and transformation matrix, geometric interpretation of homogeneous transformation matrices, composite H.T matrix ,Problems- D-H representation – problems on forward kinematics problems on forward kinematics.

UNIT-III

Manipulator jacobian – problems – **Dynamics**: Introduction , Lagrange Euler formulation , Problems

UNIT-IV

Trajectory Planning: Introduction – considerations on trajectory planning – joint Interpolated trajectory – Cartesian path trajectory – problems
Robot Programming :- Methods of robot programming – Lead through method.-Textual robot languages – Generations of programming languages – Robot language structure – Motion commands – End effector and sensor commands – VAL II programming language.

UNIT-V

Sensors: Position sensors: Potentiometers, resolvers, encoders – velocity sensors
Robot Application in Manufacturing: Material transfer and machine loading/ unloading applications – Processing operations – Assembly and inspection – Future applications.

TEXT BOOK

Mikell P.Groover, MITCHELL WEISS, ROGER N. Nagel& NICHOLAS G. Odrey; Industrial Robotics, McGraw- HILL International Editions.

REFERENCES

1. R.K.Mittal and IJ Nagrath, robotics andcontrol ,Tata Mc Graw – Hill publishing company Limited, New Delhi.
2. Robert J.Schilling, Fundamentals of robotics analysis & control, PHI learning private limited, New Delhi
3. Saeed B.Niku, Introduction to robotics analysis systems Application, PHI learning private limited, New Delhi
4. K.S.Fu, R.C Gonzalez and C.S.G.Lee, Robotics control, Sensing, vision, and intelligence; Mc Graw HILL International Editions

T128 – BIOMEDICAL INSTRUMENTATION

Lecture	**: 3 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**:**	**External Marks**	**: 75**
Credits	**: 3**	**External Examination**	**: 3 Hrs**

OBJECTIVES

To study different types of electrodes used in bio-potential recording.
- To understand the characteristics of bio-amplifiers and different types of recorders.
- To understand how to measure various biochemical and nonelectrical parameters of human system.
- To study the instrumentation concerned with measuring the blood flow volume, velocity and number of particles in the blood.

UNIT - I

Components of medical instrumentation system, Bio signals, Static & Dynamic Characteristics ,Bio amplifier, Problems with components of Medical system, Cell structure, Nernest equation, Action & Resting potentials.

UNIT - II

Bio-potential electrodes ,Bio chemical electrodes, Internal Electrodes, External electrodes.

UNIT - III

ECG –Heart cardiac cycle, Electrical & Mechanical activities of heart, Cardiovascular system, ECG Recorder, Enthoven triangle (12-Lead configuration) , Blood Pressure measurement, Blood flow measurement, Electrodes for ECG.

UNIT - IV

Pacemaker, Defibrillators , Short wave Diathermy ,Hemo-Dialysis ,EEG-Anatomy ,Recorders ,Electrodes for EEG ,Electrode-Placement, MG-Introduction ,Recorder ,Electrodes for EMG.

UNIT - V

Respiration, Spirometry ,Pnuemotachograph ,Ventilators.

TEXT BOOK

Bio medical instrumentation & measurements – 2nd edition by leslie chromwell, fred j. Weibell, erich a. Pfeiffer – phi publisher

REFERENCES

1. Bio medical instrumentation—Armugam.
2. Medical instrumentation application & design – 3rd edition by jhon g.webster, editor jhon wiley.

LBRCE EXAMINATION SECTION

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