KONGU ENGINEERING COLLEGE
PERUNDURAI ERODE – 638 052
(Autonomous)

VISION

To be a centre of excellence for development and dissemination of knowledge in Applied science, Technology, Engineering and Management for the Nation and beyond.

MISSION

We are committed to value based Education, Research and Consultancy in Engineering and Management and to bring out technically competent, ethically strong and quality professionals to keep our Nation ahead in the competitive knowledge intensive world.

QUALITY POLICY

We are committed to

- Providing value based quality education for the development of students as competent and responsible citizens.
- Contributing to the nation and beyond through research and development.
- Continuously improving our services.

DEPARTMENT OF ELECTRONICS AND INSTRUMENTATION ENGINEERING

VISION

To become a technically competent centre in the domain of Electronics and Instrumentation Engineering to take care of the National and International needs.

MISSION

Department of Electronics and Instrumentation Engineering is committed:

MS1: To develop innovative, competent, efficient, disciplined and quality Electronics and Instrumentation Engineers

MS2: To produce Engineers who can participate in technical advancement and social upliftment of the country

MS3: To excel in academic and research activities by facilitating the students to explore the state – of – the – art techniques to meet the industrial needs

2011 REGULATIONS

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

Graduates of Electronics and Instrumentation Engineering will:

PEO1: Excel in professional career and higher education using their fundamental knowledge in mathematical and engineering principles.

PEO2: Analyse, design, develop and maintain the instrumentation systems of an industry and also offer solutions that are technically feasible, economically viable and socially relevant

PEO3: Exhibit professional Ethical code of conduct communication skills, team work and lifelong learning resolve societal issues.

MAPPING OF MISSION STATEMENTS (MS) WITH PEOs

MS\PEO	PEO1	PEO2	PEO3
MS1	3	1	-
MS2	-	2	-
MS3	-	-	3

1 – Slight, 2 – Moderate, 3 – Substantial

PROGRAM OUTCOMES (POs)

Graduates of Electronics and Instrumentation Engineering will be able to :

a. an ability to apply knowledge of mathematics, science, and engineering

b. an ability to design and conduct experiments, as well as to analyze and interpret data,

c. an ability to design a system, component, or process to meet desired needs with in realistic constraints,

d. an ability to function on multidisciplinary teams,

e. an ability to identify, formulate, and solve engineering problems,

f. an understanding of professional and ethical responsibility,

g. an ability to communicate effectively,

h. the broad education necessary to understand the impact of engineering solutions in global, economic, environmental and societal context,

i. a recognition of the need for and an ability to engage in life – long learning,

j. a knowledge of contemporary issues,

k. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice,

l. an ability to develop industrial instrumentation and automation systems,

m an initiative to become entrepreneur by inculcating the skills of project management and finance with the knowledge of instrumentation technology.

MAPPING OF PEOs WITH POs

PEO\PO	a	b	c	d	e	f	g	h	i	j	k	l	m
PEO1	2	3	2	-	-	-	-	-	-	-	-	3	-
PEO2	1	2	3	-	-	-	-	-	-	-	-	3	-
PEO3	-	3	1	-	-	-	-	-	-	-	-	3	-

1 – Slight, 2 – Moderate, 3 – Substantial

CURRICULUM BREAKDOWN STRUCTURE UNDER REGULATION 2011

Curriculum Breakdown Structure(CBS)	Curriculum Content (% of total number of credits of the program)	Total number of contact hours	Total number of credits
Basic Sciences(BS)	20.32	519	37
Engineering Sciences(ES)	8.79	204	16
Humanities and Social Sciences(HS)	4.94	135	09
Program Core(PC)	54.39	1317	99
Program Electives(PE)	6.59	180	12
Open Electives(OE)	-	-	-
Project(s)/Internships(PR)	4.94	324	9
Total			**182**

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B.E. DEGREE IN ELECTRONICS AND INSTRUMENTATION ENGINEERING

CURRICULUM

(For the candidates admitted from academic year 2011-12 onwards)

SEMESTER – I

Course Code	Course Title	Hours / Week			Credit	Maximum Marks			CBS
		L	T	P		CA	ESE	Total	
	THEORY								
11EL101	Technical English	3	0	0	3	50	50	100	BS
11MA101	Engineering Mathematics-I	3	1	0	4	50	50	100	BS
11PH101	Applied Physics	3	0	0	3	50	50	100	BS
11CY101	Applied Chemistry	3	0	0	3	50	50	100	BS
11ME101	Basics of Civil and Mechanical Engineering	3	0	0	3	50	50	100	ES
11ME102	Engineering Drawing	2	0	3	3	50	50	100	ES
	PRACTICAL								
11PH102	Physical Sciences Laboratory-I	0	0	3	1	50	50	100	BS
11ME103	Engineering Practices Laboratory	0	0	3	1	50	50	100	ES
				Total	**21**				

CA - Continuous Assessment, ESE - End Semester Examination CBS – Curriculum Breakdown Structure

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CURRICULUM
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SEMESTER – II

Course Code	Course Title	Hours / Week			Credit	Maximum Marks			CBS
		L	T	P		CA	ESE	Total	
	THEORY								
11EL201	Communication Skills	3	0	0	3	50	50	100	BS
11MA201	Engineering Mathematics-II	3	1	0	4	50	50	100	BS
11PH201	Materials Science	3	0	0	3	50	50	100	BS
11CY201	Environmental Science	3	0	0	3	50	50	100	BS
11CS101	Problem Solving and Programming	3	0	0	3	50	50	100	ES
11EE201	Circuit Theory	3	1	0	4	50	50	100	ES
	PRACTICAL								
11PH202	Physical Sciences Laboratory-II	0	0	3	1	50	50	100	BS
11CS102	Programming Laboratory	0	0	3	1	50	50	100	ES
11EE202	Circuits Laboratory	0	0	3	1	50	50	100	ES
				Total	**23**				

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CBS – Curriculum Breakdown Structure

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CURRICULUM
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SEMESTER - III

Course Code	Course Title	Hours / Week			Credit	Maximum Marks			CBS
		L	T	P		CA	ESE	Total	
	THEORY								
11MA301	Engineering Mathematics- III	3	1	0	4	50	50	100	BS
11EI301	Electrical Measurements and Instruments	3	1	0	4	50	50	100	PC
11EI302	Transducer Engineering	3	0	0	3	50	50	100	PC
11EI303	Electron Devices and Circuits	3	0	0	3	50	50	100	PC
11EI304	Digital Logic Circuits	3	1	0	4	50	50	100	PC
11CS301	Data Structures and Algorithms	3	1	0	4	50	50	100	PC
	PRACTICAL								
11EC308	Devices and Circuits Laboratory	0	0	3	1	50	50	100	PC
11CS305	Data Structures and Algorithms Laboratory	0	0	3	1	50	50	100	PC
11EI305	Transducers and Measurements Laboratory	0	0	3	1	50	50	100	PC
				Total	**25**				

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CURRICULUM
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SEMESTER - IV

Course Code	Course Title	Hours / Week			Credit	Maximum Marks			CBS
		L	T	P		CA	ESE	Total	
	THEORY								
11MA401	Numerical Methods	3	1	0	4	50	50	100	BS
11EC408	Communication Engineering	3	0	0	3	50	50	100	PC
11EI401	Industrial Instrumentation-I	3	0	0	3	50	50	100	PC
11EI403	Analog Integrated Circuits	3	0	0	3	50	50	100	PC
11EE301	Electrical Machines	3	1	0	4	50	50	100	PC
11ME408	Thermodynamics and Fluid Mechanics	3	1	0	4	50	50	100	PC
	PRACTICAL								
11EI404	Analog and Digital Integrated Circuits Laboratory	0	0	3	1	50	50	100	PC
11EE304	Electrical Machines Laboratory	0	0	3	1	50	50	100	PC
11EL202	Communication Skills Laboratory	0	0	3	1	50	50	100	BS
				Total	**24**				

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CURRICULUM
(For the candidates admitted from academic year 2011-12 onwards)

SEMESTER - V

Course Code	Course Title	Hours / Week			Credit	Maximum Marks			CBS
		L	T	P		CA	ESE	Total	
	THEORY								
11EI501	Industrial Instrumentation - II	3	0	0	3	50	50	100	PC
11EI502	VLSI Systems	3	0	0	3	50	50	100	PC
11EI503	Analytical Instrumentation	3	0	0	3	50	50	100	PC
11EE503	Control Systems	3	1	0	4	50	50	100	PC
11EE504	Microprocessors and Microcontrollers	3	0	0	3	50	50	100	PC
11EE603	Power Electronics	3	0	0	3	50	50	100	PC
	PRACTICAL								
11EI504	Industrial Instrumentation Laboratory	0	0	3	1	50	50	100	PC
11EI505	Simulation and Control Laboratory	0	0	3	1	50	50	100	PC
11ME510	Thermodynamics and Fluid Mechanics Laboratory	0	0	3	1	50	50	100	PC
				Total	**22**				

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CURRICULUM
(For the candidates admitted from academic year 2011 – 12 onwards)

SEMESTER –VI

Course Code	Course Title	Hours / Week			Credit	Maximum Marks			CBS
		L	T	P		CA	ESE	Total	
	THEORY								
11GE601	Economics and Management for Engineers	3	0	0	3	50	50	100	HS
11EI601	Process Control	3	1	0	4	50	50	100	PC
11EI602	Instrumentation System Design	3	1	0	4	50	50	100	PC
11EI603	Biomedical Instrumentation	3	0	0	3	50	50	100	PC
11EE604	Digital Signal Processing and Applications	3	1	0	4	50	50	100	PC
11EI605	Embedded Control	3	0	0	3	50	50	100	PC
	PRACTICAL								
11EI604	Process Control Laboratory	0	0	3	1	50	50	100	PC
11EE606	Digital Signal Processing and Applications Laboratory	0	0	3	1	50	50	100	PC
11EE506	Microprocessors and Microcontrollers Laboratory	0	0	3	1	50	50	100	PC
				Total	**24**				

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CURRICULUM
(For the candidates admitted from academic year 2011 – 12 onwards)

SEMESTER – VII

Course Code	Course Title	Hours / Week			Credit	Maximum Marks			CBS
		L	T	P		CA	ESE	Total	
	THEORY								
11GE701	Total Quality Management	3	0	0	3	50	50	100	HS
11EI701	PLC, SCADA and DCS	3	0	0	3	50	50	100	PC
11EI702	Power Plant Instrumentation	3	0	0	3	50	50	100	PC
11EI703	Computer Control of Processes	3	1	0	4	50	50	100	PC
	Elective – I	3	0	0	3	50	50	100	PE
	Elective – II	3	0	0	3	50	50	100	PE
	PRACTICAL								
11EI704	PLC, SCADA and DCS Laboratory	0	0	3	1	50	50	100	PC
11EI705	Instrumentation System Design Laboratory	0	0	3	1	50	50	100	PC
11EI706	Virtual Instrumentation Laboratory	0	0	3	1	50	50	100	PC
				Total	**22**				

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CURRICULUM
(For the candidates admitted from academic year 2011 – 12 onwards)

SEMESTER – VIII

Course Code	Course Title	Hours / Week			Credit	Maximum Marks			CBS
		L	T	P		CA	ESE	Total	
	THEORY								
11GE801	Professional Ethics and Human Values	3	0	0	3	50	50	100	HS
11EI801	Instrumentation and Control in Petrochemical Industries	3	0	0	3	50	50	100	PC
	Elective – III	3	0	0	3	50	50	100	PE
	Elective – IV	3	0	0	3	50	50	100	PE
	PRACTICAL								
11EI802	Project Work	0	0	18	9	100	100	200	PR
				Total	**21**				

CA - Continuous Assessment, ESE - End Semester Examination
CBS – Curriculum Breakdown Structure

LIST OF ELECTIVES						
Course Code	**Course Title**	**L**	**T**	**P**	**C**	**CBS**
11CS304	Software Engineering	3	0	0	3	PE
11CS401	Data Base Management System	3	0	0	3	PE
11CS402	Operating Systems	3	0	0	3	PE
11EC017	Digital Image Processing	3	0	0	3	PE
11EE013	Electric Power Utilization and Energy Auditing	3	0	0	3	PE
11EE702	Electric Drives and Controls	3	0	0	3	PE
11EI011	Industrial Data Communication	3	0	0	3	PC
11EI013	Environmental Instrumentation	3	0	0	3	PC
11EI014	Fiber Optics and Laser Instrumentation	3	0	0	3	PC
11EI015	Optimal Control	3	1	0	4	PE
11EI016	Computer Architecture and Networks	3	0	0	3	PE
11EI017	Adaptive Control	3	0	0	3	PE
11EI018	Neural Networks and Fuzzy Systems	3	0	0	3	PE
11EI019	Optimization Techniques	3	1	0	4	PE
11EI020	VLSI for Signal processing	3	1	0	4	PE
11GE011	Entrepreneurship Development	3	0	0	3	HS
11MT012	Micro Electro Mechanical Systems	3	0	0	3	PE
11MT702	Robotics and Machine Vision Systems	3	0	0	3	PE
11MA601	Probability and Statistics	3	1	0	4	BS
11CH604	Process Modeling and Simulation	3	1	0	4	PC

11EL101 TECHNICAL ENGLISH

(Common to all Engineering and Technology branches)

3 0 0 3

MODULE – I **17**

Grammar and Vocabulary: Word formation with prefixes and suffixes – Synonyms and Antonyms – Verb Patterns – Tenses (simple and compound tenses) - Simple, Compound and Complex Sentences - Voice – Use of Conditionals - Comparative Adjectives (affirmative and negative) – Expanding Nominal compounds - Articles - Use of Prepositions – Identifying Odd Words – Acronyms.

MODULE – II **13**

Listening: Listening for General Content – Intensive Listening – Listening for Specific Information : Retrieval of Factual Information – Listening to Identify Topic, Context, Function, Speaker‟s Opinion, Attitude, etc. – Global Understanding Skills and Ability to infer, extract gist and understand main ideas – Note-taking: Guided and unguided- Listening to fill up gapped texts.

Writing: Introduction to the Characteristics of Technical Style - Writing Definitions and Descriptions - Paragraph Writing (topic sentence and its role, unity, coherence and use of cohesive expressions) - Process Description(use of sequencing connectives)– Comparison and Contrast - Classifying the data - analysing / interpreting the data – Personal letter - Formal letter writing (Inviting Guest Speakers, letter to the editor, letter for seeking practical training, and letter for undertaking project works in industries) – editing (punctuation, spelling and grammar) – Recommendations & Suggestions.

MODULE- III **15**

Reading: Exposure to different Reading Techniques - Reading for Gist and global meaning - Predicting the content - Skimming the text – Identifying the Topic Sentence and its role in each paragraph - Scanning - Inferring / identifying lexical and contextual meanings - Reading for structure and detail - Transfer of information / guided note-making - Understanding discourse coherence - Sequencing of sentences.

Speaking: Verbal and Non Verbal Communication - Pronunciation drills/ Tongue Twisters – Formal and Informal English - Oral practice – Developing Confidence - Introducing Oneself - Asking for or Eliciting Information - Describing Objects – Offering Suggestions and Recommendations – expressing opinions (agreement / disagreement.

TOTAL : 45

TEXT BOOK

1. “English for Engineers and Technologists”, Combined Edition, Volume. I & II, Orient Longman, Oxford University Press, New Delhi, 2006.

REFERENCE BOOKS

1. Aysha Viswamohan, “English for Technical Communication”, Tata McGraw-Hill, New Delhi, 2008.
2. Rizvi M Ashraf, "Effective Technical Communication", Fifth Edition, Tata McGraw- Hill, New Delhi, 2007.
3. Mark Ibbotson, “Cambridge English for Engineering”, Cambridge University Press, New Delhi, 2009.
4. Rama Krishna Rao, A, “Learning English: A Communicative Approach” Orient Black Swan, Hyderabad, 2008.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Improve their vocabulary and appropriate usage of words in different academic and professional contexts.
CO2: Familiarize with different rhetorical functions of technical English.
CO3: Develop strategies that could be adopted while reading texts.
CO4: Speak effectively in English and career related situations.
CO5: Acquire knowledge in academic and professional writing.

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1									2	3		1	
CO2									2	3			
CO3				2					2	3		1	
CO4									2	3			
CO5				1					1	3		1	

3 – Substantial, 2 – Moderate, 1 – Slight

11MA101 ENGINEERING MATHEMATICS – I

(Common to all Engineering and Technology branches)

3 1 0 4

MODULE – I **15**

Matrices: Linear independent and dependent of vectors – Characteristic equation – Eigen values and Eigen vectors of a real matrix – Properties of eigen values and eigen vectors (without proof) – Cayley – Hamilton theorem (without proof).

Diagonalisation: Similarity transformation (concept only) – Orthogonal matrices – Orthogonal transformation of a symmetric matrix to diagonal form – Nature of quadratic form – Reduction of quadratic form to canonical form by orthogonal transformation.

MODULE – II **15**

Differential Calculus: Curvature – Cartesian co-ordinates – Centre and radius of curvature – Circle of curvature. Involutes and evolutes – Envelopes – Properties of envelopes and evolutes.

Functions of several variables: Functions of two variables – Partial derivatives – Total differential – Maxima and minima – Constrained maxima and minima – Lagrange‟s multiplier method – Jacobians.

MODULE - III **15**

Differential Equations: Linear differential equations of Second and higher order with constant coefficients when the R.H.S is e^{ax}, x^n, $n > 0$, Sinax, Cosax, $e^{ax}x^n$, $e^{\alpha x}$ Sinβx, $e^{\alpha x}$ Cosβx, x^n Sinαx and x^n Cosαx– Differential Equations with variable coefficients (Cauchy‟s form). Method of variation of parameters - Simultaneous first order linear equations with constant coefficients.

Applications of Differential Equations: Solution of specified differential equations connected with electric circuits, simple harmonic motion (Differential equations and associated conditions need to be given).

Lecture: 45, Tutorial: 15, TOTAL: 60

TEXT BOOKS

1. Kandasamy. P, Thilagavathy. K and Gunavathy. K, “Engineering Mathematics For First Year B.E/B.Tech”, Reprint Edition 2011, S.Chand and Co., New Delhi.
2. Veerarajan. T., “Engineering Mathematics, (for first year), Reprint Edition 2011, Tata McGraw-Hill New Delhi.

REFERENCE BOOKS

1. Grewal. B.S, “Higher Engineering Mathematics”, 40th Edition, Khanna Publications, New Delhi, 2007.
2. Jain R.K and Iyengar S.R.K, “Advanced Engineering Mathematics”, 3rd Edition, Narosa Publishing House, New Delhi, 2007.
3. Bali N.P and Manish Goyal, “Text Book of Engineering Mathematics”, 3rd Edition, Laxmi Publications, New Delhi, 2008.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Solve engineering problems which needs matrix computations.

CO2: Utilize the geometrical aspects of differential calculus and extremal problems which arise in function of several variables.

CO3: Apply the concept of ordinary differential equations for modeling and finding solutions to engineering problems.

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3	3		1	2							1	
CO2	3	3										1	
CO3	3	3		1	2							1	

3 – Substantial, 2 – Moderate, 1 – Slight

11PH101 APPLIED PHYSICS

(Common to all Engineering and Technology branches)

3 0 0 3

MODULE – I **15**

Acoustics : Classification of sound – Characteristics of musical sound – Weber-Fechner law – Absorption Coefficient – Reverberation – Reverberation time – Sabine's formula (growth & decay) – Factors affecting acoustics of buildings (reverberation time, loudness, focusing, echo, echelon effect, resonance and noise) and their remedies.

Ultrasonics : Introduction – Production – Magnetostriction effect – Magnetostrictive generator - Inverse piezoelectric effect - Piezoelectric generator - Detection of ultrasonics - Properties – Cavitation - Industrial applications – drilling, welding, soldering and cleaning – SONAR - Non destructive testing – Ultrasonic pulse echo system - Medical applications – A, B and C Scan displays – Ultrasonic imaging technique.

MODULE – II **15**

Lasers: Introduction – Principle of spontaneous emission and stimulated emission - Population inversion, Pumping, Einstein"s Coefficients (A&B) - Types of lasers – Nd:YAG, CO_2, Semiconductor lasers: Homojunction and Heterojunction – Laser Applications – Industrial applications – Laser welding, Laser cutting, Laser drilling – Holography – Construction and reconstruction of images.

Fiber Optics & Applications: Principle – Classification based on materials, Modes of propagation, Refractive index profile - Crucible-crucible technique of fiber fabrication - Light sources for fiber optics – Detectors - Fiber optical communication links - Losses in optical fibers – Fiber optic sensors – Temperature, displacement, voltage and magnetic field measurement.

MODULE - III **15**

Quantum Physics and Applications: Black body radiation – Planck's theory (derivation)– Deduction of Wien's displacement law and Rayliegh – Jean's Law from Planck's theory – Compton effect – Theory and experimental verification - Matter waves – Uncertainty principle - Experimental verification – Schroedinger's wave equations – Time independent and time dependent equation – Physical Significance of wave function – Particle in a box (One dimensional) - Optical microscope – Limitations of optical microscopy - Scanning electron microscope - Transmission electron microscope.

TOTAL : 45

TEXT BOOKS

1. Avadhanalu M N and Kshirsagar P G, "A Text Book of Engineering Physics", S.Chand & company Ltd, New Delhi, 2007.
2. Palanisamy P K, "Engineering Physics", Scitech Publications, Chennai, 2008.

REFERENCE BOOKS

1. Gaur R K and Gupta S L , "Engineering Physics", Dhanpat Rai and Sons, New Delhi, 2006.
2. Rajendran V, "Engineering Physics", Prentice Hall of India, New Delhi, 2008.
3. Rajagopal K, "Textbook of Engineering Physics", Part I, PHI Learning Pvt. Ltd., New Delhi, 2008.
4. Personick S D, "Fibre Optics, Technology and Applications", Khanna Publishers New Delhi, 1987.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Get an insight into design of acoustically good buildings and applications of laser in engineering

CO2: Gain basic knowledge in Fiber optic concepts and fiber optic communication link

CO3: Understand the applications of quantum physics to optical and electrical phenomena

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3												
CO2	2							2					
CO3	3							2					

3 – Substantial, 2 – Moderate, 1 – Slight

11CY101 APPLIED CHEMISTRY

(Common to all Engineering and Technology branches)

3 0 0 3

MODULE – I **15**

Water: Introduction - Sources of water - impurities in water - Types of water - Water quality standards - Water quality parameters (Discussion not required) - Hardness of water- Expression of hardness - Units of hardness –Estimation of Hardness of water by EDTA method – Determination of alkalinity - Disadvantages of using hard water - Boiler troubles due to hard water - scale and sludge formation – Boiler corrosion – caustic embrittlement- priming and foaming-Softening of water- External treatment methods - Lime soda, zeolite and demineralization process (principle, process, advantages and disadvantages only) Internal treatment process - colloidal, carbonate, calgon and phosphate conditioning (brief discussion only) - desalination by reverse osmosis method. **Electrochemistry:** Introduction - Cells – Representation of a galvanic cell - EMF measurements and its applications – Electrode potential - Nernst Equation – Reference electrodes (hydrogen and calomel electrodes) – Electrochemical series and its applications – Conductometric titrations (strong acid Vs strong base only) - Batteries – Lead acid and Ni-Cd batteries.

MODULE – II **15**

Corrosion and Its Control: Introduction – Mechanism of dry and wet corrosion – galvanic corrosion - concentration cell corrosion – Galvanic series - Factors influencing rate of corrosion – corrosion control methods - Sacrificial anode and impressed current cathodic method – Corrosion inhibitors - Protective coatings - classifications - Pretreatment of metal surface - Metallic coating -electroplating and electrolessplating (General discussion) - Hot dipping (Tinning and galvanising) - Nonmetallic coating - surface conversion coating (phosphate coating and anodized coating) - Organic coating - paints – constituents and their function – Special paints (Fire retardant, temperature indicating, water repellant and luminescent paints) **Combustion:** Introduction – Calorific Values – Gross and net – Theoretical calculation of minimum air for combustion (Theoretical aspects only) – flue gas analysis – Orsat‟s method - Explosive range and Spontaneous Ignition Temperature.

MODULE - III **15**

Fuels: coal – proximate and ultimate analysis – their importance – metallurgical coke - Otto-Hoffman byproduct method - Liquid fuel - refining of petroleum - Straight run, cracked and polymer petrol – Manufacture of synthetic petrol - polymerization (thermal and catalytic methods) - Hydrogenation of coal (Fisher Tropsch and Bergius methods) - knocking - octane number – improving octane number by additives – Diesel – cetane number – Gaseous fuels (Water gas, producer gas and biogas)

Polymers: Introduction – Nomenclature of polymers – functionality – polymerization - types – addition, condensation and co-polymerization with examples – Effect of polymer structure on properties (strength, plastic deformation, crystallinity and chemical resistance) - plastics – types (thermo and thermosetting plastics) - individual polymers - Polyethylene, polypropylene, PVC, Teflon, Bakelite and epoxy resin (preparation, properties and uses only) - Compounding of plastics-Fabrication of plastics (compression, injection and extrusion moulding methods) – conducting polymers

TOTAL : 45

TEXT BOOK

1. Jain PC and Monica Jain, “Engineering Chemistry”, 15th Edition, Dhanpat Rai publication Co., New Delhi, 2008.

REFERENCE BOOKS

1. Dara S.S., “A Text Book of Engineering Chemistry”, S.Chand & Co. Ltd., New Delhi, 2006.
2. Sharma B.K., “Engineering Chemistry”, Krishna Prakasan Media (P) Ltd., Meerut, 2001.
3. Sivasankar B., “Engineering Chemistry”, Tata McGraw-Hill, New Delhi, 2008.
4. Krishnamurthy N., “Engineering Chemistry”, 2nd Edition, PHI Learning private Limited, New Delhi, 2008.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Acquire the basic knowledge of water treatment

CO2: **understand the principles of** electro chemistry, electrochemical cells, EMF series and energy storing devices

CO3: Understand the types and prevention methods of corrosion

CO4: Understand the developments in polymers and plastics

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3		3			3						2	
CO2	3		2			3		3				1	
CO3	3		2			3		3				1	
CO4	3		3			3		3				2	

3 – Substantial, 2 – Moderate, 1 – Slight

11ME101 BASICS OF CIVIL AND MECHANICAL ENGINEERING

(Common to all Engineering and Technology branches)

3 0 0 3

PART-A: CIVIL ENGINEERING

MODULE – I **7**

Construction Materials: Introduction – Civil Engineering – Materials – bricks – stones – sand – cement – concrete – steel sections – Site selection for foundations – Bearing capacity – loads – Types of foundations – requirements.

MODULE – II **7**

Elements of Structures: Superstructure – brick masonry – stone masonry – beams – columns – lintels – roofing – flooring – plastering – Types of Bridges and Dams.

MODULE - III **8**

Elements of Surveying: Surveying – Objects – types – classification – principles – measurements of distances – Determination of areas –Building area calculation – illustrative examples – Basics of Interior and Landscaping.

PART–B: BASIC MECHANICAL ENGINEERING

MODULE – I Metal Forming and Joining Processes **7**

Foundry: Introduction- patterns – molding –casting - cupola furnace.

Forming: Introduction-Classification- Rolling, extrusion, and drawing.

Welding: Introduction-Classification - TIG, MIG welding, Gas welding, soldering and brazing.

Machining process: Introduction-Classification – lathe and drilling machines.

MODULE – II **8**

Boilers and Power Plants

Steam Boilers: Introduction-Classification- Working Principle of Cochran boiler, Babcock and Wilcox boiler- Benson boiler - Boiler Mountings and accessories. Power Plants: Classification of power plants – working principle of steam, Diesel, Hydro-electric and Nuclear Power plants-Merits and Demerits.

MODULE – III **8**

IC Engines, Refrigeration and Air-conditioning: IC Engines: Classification-components - Working principle of Petrol and Diesel Engines- Four stroke and two stroke cycles- Comparison of four stroke and two stroke engines. Working principle of carburetor, fuel pump and multi point fuel injector. **Refrigeration and Air Conditioning System:** Terminology of Refrigeration and Air conditioning, Properties of refrigerant -Principle of vapour compression and absorption system - Layout of typical domestic refrigerator - Window and Split type room Air conditioner.

TOTAL : 45

TEXT BOOKS

1. Palanichamy, M S., "Basic Civil Engineering", Tata McGraw-Hill, New Delhi, 2006.
2. Shanmugam, G, "Basic Mechanical Engineering", 4th Edition, Tata McGraw-Hill, New Delhi, 2011.

REFERENCE BOOKS

1. Rao, M.S., "Basics of Civil Engineering", Dhanpat Rai and Co, New Delhi, 2006.
2. Venugopal, K and Prabhu Raja, V, "Basic Mechanical Engineering", Sixth Edition, Anuradha Publishers, Kumbakonam, 2005.
3. Rao, P N, "Manufacturing Technology: Foundry, Forming and Welding", Tata McGraw-Hill, New Delhi, 2008.
4. Rajan, T.S, "Basic Mechanical Engineering", 3rd Edition, New Age International Publishers, New Delhi, 2009.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: select the suitable construction materials and foundation required for a building
CO2: recall the various elements of the super structure
CO3: point out the various elements of surveying and landscaping
CO4: demonstrate the ability to describe the basics of metal forming and joining processes.
CO5: demonstrate the knowledge on patterns, molding, casting, rolling, extrusion, drawing, TIG, MIG welding, gas welding, soldering and brazing.
CO6: describe basics of boilers and power plants.
CO7: explain the working principle of steam, Diesel, Hydro-electric and Nuclear power plants.
CO8: demonstrate the working of IC engines, Refrigeration and Air-conditioning systems.

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3	2	2	2	2	1							
CO2	3	2	2	2	2	1							
CO3	3	2	2	2	2	1							
CO4	3				2			1				3	
CO5	3				2			3				2	
CO6	3				2			1				3	
CO7	3				3			2				3	
CO8	3				2			1				3	

3 – Substantial, 2 – Moderate, 1 – Slight

11ME102 ENGINEERING DRAWING

(Common to all Engineering and Technology branches)

2 0 3 3

Concepts (Not for Exam)

Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

MODULE – I **15**

Projections of Points, Lines, Planes and Solids:

General principles of orthographic projection – First angle projection – Layout of views – Projection of points, located in all quadrant and straight lines located in the first quadrant – Determination of true lengths and true inclinations and location of traces – Projection of polygonal surface and circular lamina inclined to both reference planes.

Projections of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method.

MODULE – II **15**

Sectioning and development of solids:

Sectioning of solids- prisms, pyramids, cylinder and cone in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other – Obtaining true shape of section.

Development of lateral surfaces of simple and truncated solids – prisms, pyramids, cylinders and cone with cutout, perpendicular and inclined to the horizontal axis.

MODULE- III **15**

Isometric projection and Perspective projection :

Principles of isometric projection – isometric scale – isometric projections of simple solids, truncated prisms, pyramids, cylinders and cones

Conversion of isometric projection into orthographic projection.

Perspective projection of prisms, pyramids and cylinders by visual ray method.

TOTAL: 45

TEXT BOOKS

1. Venugopal K. and Prabhu Raja V. "Engineering Graphics", New Age International (P) Limited, New Delhi, 2008.
2. Dhananjay A. Jolhe, "Engineering Drawing with an introduction to AutoCAD", Tata McGraw Hill, New Delhi, 2008.

REFERENCE BOOKS

1. Bhatt N.D, "Engineering Drawing", 46th Edition, Charotar Publishing House, Anand, 2003.
2. Gopalakrishnana K.R., "Engineering Drawing", Volume. I & II, Subhas Publications, Bangaluru, 2006.
3. Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw-Hill, New Delhi, 2008.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: prepare elementary sketches of 2D and 3D objects with correct interpretation and mark dimensions properly.

CO2: draw multi-view orthographic and other projections including isometric, sectional, true and perspective.

CO3: read, understand, interpret drawings and communicate effectively.

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3				2				3				
CO2	3				2				2				
CO3	3				2				2				

3 – Substantial, 2 – Moderate, 1 – Slight

11ME103 ENGINEERING PRACTICES LABORATORY

(Common to all Engineering and Technology branches)

0 0 3 1

PART-A: CIVIL & MECHANICAL

LIST OF EXPERIMENTS

1.FITTING

Tools & Equipments – Practice in Filing and Drilling.
Making Vee Joints, Square, dovetail joints, Key Making.

2. PLUMBING

Tools & Equipments - Pipe connection for a bath room, Pipe connection for multi-storey building,
Pipe connection with different components like valves, tap, coupling, union, reducers, elbows etc.
Plumbing work with metal, PVC and flexible hoses (Threading, joining of pipes)

3.CARPENTRY

Tools and Equipments- Planning practice. Making Half Lap, dovetail, Mortise & Tenon joints, a mini model of a single door window frame.
Making of Pen stand, Box, etc. from plywood. (Use of modern power tools for cutting)

4.SHEET METAL

Tools and equipments - Fabrication of a small cabinet, Rectangular Hopper, etc.

5.WELDING

Tools and equipments - Arc and Gas welding of butt joint, Lap Joint and Tee Fillet.

REFERENCES / MANUALS / SOFTWARE:

1. Suyambazhahan, S, "Engineering Practices Laboratory Manual", PHI Learning, NewDelhi, 2010.
2. John, K. C., "Mechanical Workshop Practice", Second Edition, PHI Learning, NewDelhi, 2009.

PART-B: ELECTRICAL & ELECTRONICS

1. Safety aspects of Electrical wiring.
2. Wiring circuit for a lamp using single and two way switches (stair case).
3. Wiring circuit for fluorescent lamp.
4. Study of Electronic components and equipment – Resistor-colour coding, measurement of AC Signal parameter (Peak-Peak, RMS Value, Frequency and Power factor) using CRO
5. Assembling electronic components on a small PCB (Etching, Fabrication and Testing)
6. Measurement of earth resistance and insulation resistance of an electrical equipment
7. Study of Telephone, FM radio & Transducers.
8. Study of Mixie, Iron box, Ceiling & Table Fans.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: understand the functions of different tools used in fitting, carpentry, sheet metals and welding.

CO2: prepare different types of joints in metal pieces, sheet metals and wooden pieces.

CO3: plan and fabricate simple models.

CO4: utilize the basic laboratory equipment

CO5: build the layout of domestic wiring circuits and troubleshoot it.

CO6: estimate Earth Resistance, assemble electronic components in PCB and understand operation of various domestic appliances

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	2							2			1		
CO2	2							3			2		
CO3	3							2			2		
CO4	3		1		3						2	3	
CO5	3	2			2	3						3	
CO6	3					2						3	

3 – Substantial, 2 – Moderate, 1 – Slight

11EL201 COMMUNICATION SKILLS

(Common to all Engineering and Technology branches)

3 0 0 3

MODULE – I **15**

Focus on language: Cause and effect expressions - indicators of purpose and function - connectives -imperatives - modal verbs - infinitives and gerunds - reporting verbs - homonyms - commonly confused (mispronounced and misspelt) words - phrasal verbs - British and American Vocabulary.- rules for writing SI [system international] units - concord.

MODULE – II **15**

Listening: Listening practice - Radio / TV news - documentaries - listening to short and long conversations in different domains of activity/ live speech - new inventions, products, announcements, casual conversation, and academic lectures.

Writing: Formal letter writing (letter of application - job application) , Business (calling for quotation, placing orders , letter of complaint) - structure of memorandum and technical reports (reports on visits made to industries, report on an accident in the factory, meeting report) – notices - agenda - instructions - e-mails - Preparing Checklist- note taking and note making.

MODULE- III **15**

Speaking: Communication – accuracy, fluency, appropriateness – levels of formality – oral practice activities related to professional skills – role play using different functions (persuasion, negotiation, giving directions and guidance) – conversational etiquette (greetings, making requests, permission, accepting, denying, declining, politeness strategies, turn-taking, body language) – making speeches – describing people, place, things and events.

Reading: Reading comprehension – guided note- making – providing a suitable title - identifying main points, supporting ideas – evaluating the style (argumentative / descriptive etc) – drawing inferences separating facts from opinions – interpreting text in different genres.

TOTAL : 45

TEXT BOOK

1. Department of Science and Humanities, Anna University, Chennai. “English for Engineers and Technologists”, Combined Edition Volumes (I & II), Orient Longman, Oxford University Press, New Delhi, 2006.

REFERENCE BOOKS

1. Kiranmai. Dutt P, Geetha Rajeevan and Prakash, C. L. N., “A Course in Communication Skills”, Cambridge University Press, New Delhi, 2007.
2. Meenakshi Raman and Sangeetha Sharma, “Technical Communication”, Oxford University Press, New Delhi, 2006.
3. Sangeetha Sharma and Binod Mishra, “Communication Skills for Engineers and Scientists”, PHI Learning, New Delhi, 2009.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Improve their vocabulary and appropriate usage of words.

CO2: Familiarize with different rhetorical functions of technical English.

CO3: Speak effectively in English in real-life and career-related situations.

CO4: Acquire knowledge in academic and professional writing.

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1									2	3		1	
CO2									2	3			
CO3									1	3			
CO4				1					1	3		1	

3 – Substantial, 2 – Moderate, 1 – Slight

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11MA201 ENGINEERING MATHEMATICS – II

(Common to all Engineering and Technology branches)

3 1 0 4

MODULE – I **15**

Multiple Integrals: Double integration in Cartesian coordinates – Change of order of integration – Area between two curves – Area as double integrals – Triple integration in Cartesian coordinates –Volume as Triple integrals (Simple problems only).

Vector Calculus: Gradient, divergence and curl – Line, surface integral (Concept Only) and volume integrals (Concept Only) – Green‟s, Gauss divergence and Stoke's theorems (without proof) – Verification of the above theorems and evaluation of integrals using them (Simple problems only).

MODULE – II **15**

Analytic Functions: Functions of a complex variable – Analytic functions – Necessary conditions and Sufficient conditions (excluding proof) – Cauchy– Riemann equations — Properties of analytic function (Statement only) – Harmonic functions – Construction of Analytic functions – Conformal mapping: $w = z + a$, az, $1/Z$- Bilinear transformation.

Complex Integration: Cauchy's theorem (without proof) – Cauchy's integral formula – Taylor and Laurent's series (without proof) – Singularities – Classification – Cauchy's residue theorem (Statement only) – Contour integration – circular and semi- circular contours (excluding poles on real axis).

MODULE – III **15**

Laplace Transforms: Conditions for existence – Transform of elementary functions –Basic properties – Derivatives and integrals of transforms – Transforms of derivatives and integrals – Initial and final value theorems – Transform of unit step function – Transform of periodic functions.

Inverse Laplace transforms: Inverse Transform of elementary functions – Partial fraction method – Convolution theorem (without proof) – Solution of linear ODE of second order with constant coefficients .

Lecture: 45, Tutorial: 15, TOTAL: 60

TEXT BOOKS

1. Kandasamy. P, Thilagavathy. K and Gunavathy. K, "Engineering Mathematics For First Year B.E/B.Tech", Reprint Edition 2011, S.Chand and Co., New Delhi.
2. Veerarajan. T., "Engineering Mathematics, (for first year), Reprint Edition 2011, Tata McGraw-Hill New Delhi.

REFERENCE BOOKS

1. Grewal. B.S, "Higher Engineering Mathematics", 40th Edition, Khanna Publications, New Delhi, 2007.
2. Jain R.K and Iyengar S.R.K, "Advanced Engineering Mathematics", Third Edition, Narosa Publishing House, New Delhi, 2007.
3. Bali. N.P and Manish Goyal, "Text Book of Engineering Mathematics", Third Edition, Laxmi Publications, New Delhi, 2008.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Identify problems involving vectors, double and triple integrals CO2: Measure the knowledge of analytic functions.

CO3: Evaluate complex integrals which are extensively applied in engineering. CO4: Adapt Laplace transforms to solve practical problems.

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	L	m
CO1	3	3		1	2							1	
CO2	3											1	
CO3	3	3		1	2							1	
CO4	3	3		1	2							1	

1 – Slight, 2 – Moderate, 3 – Substantial

11PH201 MATERIALS SCIENCE

(Common to all Engineering and Technology branches)

3 0 0 3

MODULE – I **15**

Crystal Physics: Introduction – Lattice – Unit cell – Crystal systems – Bravais lattice – Lattice planes – Miller indices – d spacing in cubic lattice – Atomic radius – Coordination number – Packing factor for SC, BCC, FCC and HCP structures – Crystal imperfections : Point, line and surface imperfections.

Conducting Materials: Conductors – Classical free electron theory of metals – Electrical and thermal conductivity – Wiedemann – Franz law – Lorentz number – Draw backs of classical theory – Quantum theory – Fermi distribution function – Effect of temperature on Fermi Function – Density of energy states – Carrier concentration in metals.

MODULE – II **15**

Semiconducting Materials: Intrinsic semiconductor – Carrier concentration derivation – Extrinsic semiconductors – Carrier concentration derivation in n-type and p-type semiconductors – Hall effect – Determination of Hall coefficient – Applications - Semiconductor devices – Solar cells - LDR.

Magnetic and Dielectric Materials: Types of magnetic materials – Domain theory – Hysteresis – Soft and hard magnetic materials - Magnetic devices – Transformer core - Magneto optical recording - Dielectric constant - Qualitative study of polarization – Frequency and temperature dependence of polarization – Dielectric loss – Dielectric breakdown – Uses of dielectric materials (capacitor and transformer) – Ferro electric materials.

MODULE- III **15**

Smart Materials : Metallic glasses: Preparation, properties and applications - Shape memory alloys (SMA): Characteristics, properties, applications, advantages and disadvantages of SMA – Superconductors: Properties – Types of superconductors – BCS theory of superconductivity(Qualitative) - High T_c superconductors – Applications of superconductors – SQUID – cryotron - magnetic levitation.

Nano Materials: Synthesis: Lithographics – Vapour phase physical and chemical deposition methods - Colloidal and solgel methods - Properties of nanoparticles and applications - Carbon nanotubes: Structure – Properties – Fabrication by Laser ablation – Applications.

TOTAL : 45

TEXT BOOKS

1. Kittel. Charles, “Introduction to Solid State Physics”, Seventh Edition, John Wiley & sons, Singapore, 2007.
2. Poole. Charles P and Ownen. Frank J., “Introduction to Nanotechnology”, Wiley India, 2007. (For Module III).

REFERENCE BOOKS

1. Pillai. S O, “Solid State Physics”, Fifth Edition, New Age International, New Delhi, 2003.
2. Rajendran. V, “Engineering Physics”, Prentice Hall of India, New Delhi, 2008.
3. Palanisamy. P K, “Engineering Physics - II”, SciTech publications (India), Chennai 2008.
4. Raghavan. V, “Materials Science and Engineering: A first course”, Fifth Edition, Prentice Hall of India, New Delhi, 2009.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Gain basic knowledge in concepts like crystal physics, conducting and superconducting materials

CO2: Understand the concepts of semiconducting materials, devices, magnetic and dielectric materials

CO3: Acquire basic knowledge of Smart materials, Nano materials and its applications

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3												
CO2	3												
CO3	3												

3 – Substantial, 2- Moderate, 1 - Slight

11CY201 ENVIRONMENTAL SCIENCE

(Common to all Engineering and Technology branches)

3 0 0 3

MODULE – I **15**

Introduction to Environmental Studies and Natural Resources: Introduction to Environmental Science – Forest resources: Use and over-exploitation, deforestation, case studies. – Water resources: Use and over-utilization of surface and ground 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 - effects of modern agriculture, fertilizer and 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 – Land resources: Land as a resource – Conservation Practices - Role of an individual in conservation of natural resources. **Ecosystems:** Concept of an ecosystem – Structural features – Functional attributes (Food chain and Food web only) – Introduction, types, characteristic features, structure and functions of the (a) Forest ecosystem (b) Aquatic ecosystems (ponds, rivers and oceans). **Biodiversity:** Introduction to Biodiversity – Definition - genetic, species and ecosystem diversity – Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic, option values and ecosystem service value– Hot-spots of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife – Endangered and endemic species of India – In-situ and Ex-situ conservation of biodiversity.

MODULE – II **15**

Pollution: Definition – Causes, effects and control measures of: (a) Air pollution - Climate change, global warming, acid rain, ozone layer depletion (b) Water pollution (c) Soil pollution (d) Radioactive Pollution - Solid waste Management - Disaster management: floods, earthquake, cyclones and landslides - Role of an individual in prevention of pollution - Case studies. **Water Treatment methods**: Treatment of Water for Domestic Supply (Screening, Aeration, Sedimentation with Coagulation, Filtration and Disinfection methods) - Break point chlorination –Estimation of dissolved oxygen, BOD and COD - Bacteriological examination of water - Sewage treatment (Primary, Secondary & Tertiary methods) - Miscellaneous methods of Sewage treatments (Oxidation Ponds, Aerated Lagoons, Oxidation ditch, Anaerobic Lagoons, Septic tanks) – Methods of Sewage treatment by activated sludge process – Introduction to industrial waste water treatment using Reverse Osmosis Technology- Self purification of Natural Waters - Membrane Technology for wastewater treatment - Activated carbon in pollution abatement of wastewater.

MODULE- III **15**

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 - case studies – Environmental ethics - Issues and possible solutions - Wasteland reclamation – Consumerism and waste products – Environment Production 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. **Human Population and the Environment:** Introduction - Population growth - Variation of population based on age structure - 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.

TOTAL : 45

TEXT BOOK

1 Anubha Kaushik, and Kaushik C P, "Environmental Science and Engineering", Third Edition: 2008, (Reprint 2010), New Age International (P) Ltd, New Delhi.

REFERENCE BOOKS

1 B.K.Sharma, **"** Industrial Chemistry",Tenth Edition, Krishna Prakashan Media(P) Ltd,Meerut-250001(UP), India.
2 B Uppal M M revised by S C Bhatia, "Environmental Chemistry", Sixth Edition Khanna Publishers, New Delhi, 2002.
3 Trivedi R.K. and Goel P. K., "Introduction to Air Pollution", Techno-Science Publications, Jaipur, 2003.
4 Masters. Gilbert M, "Introduction to Environmental Engineering and Science", Second Edition, Pearson Education, New Delhi, 2004.
5 Miller, T.G., "Environmental Science", Wadsworth Publishing Co.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Appreciate the importance of onservation of resources and our role in Maintaining the clean environment

CO2: Develop an understanding of ecological balance and preservation of bio-diversity

CO3: Acquire the awareness about the different types of pollution and know about the impact of population explosion

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
CO1	3											
CO2	3											
CO3	3											

3 – Substantial, 2 – Moderate, 1 – Slight

11CS101 PROBLEM SOLVING AND PROGRAMMING

(Common to all Engineering and Technology branches)

3 0 0 3

MODULE – I 15

Basics: Evolution of computers- Generations of computers- Classification of computers- Applications of computers- Hardware - Software-Information Technology-Internet Problem-Solving Techniques- Program Control Structures- Programming Paradigms and Languages-Generations of Programming Languages.

Problem Solving: Introduction – Problem Solving Aspects- Top-Down Design-Implementation of Algorithms- Program Verification- Efficiency of Algorithms- Analysis of Algorithms- Fundamental algorithm- Factorial Computation - Generation of Fibonacci Sequence.

MODULE – II 15

C Fundamentals and Arrays: Introduction to C – C programming structure – C character set – Identifiers – keywords. Data types – Constants – variables- Operators – Expressions – Library functions Managing Input and Output – formatted input and output. Control statements – Decision making and branching – Looping structures- Arrays – One dimensional array – Two dimensional arrays – Multidimensional arrays. Character arrays and

MODULE - III 15

Functions, Structures and Files: Functions - User defined functions: declaration, definition function call and parameter passing mechanisms – Recursion –Array and Functions - User defined data types –typedef - Structures – Unions –File operations in C- Introduction to pointer –Pointer Declaration and Initialization-Accessing a Variable through a pointer- Difference between array and Pointers

TOTAL : 45

TEXT BOOKS

1. Kamthane, Ashok N. "Computer Programming", Pearson Education, New Delhi, 2007.
2. Dromey, R.G., "How to solve it by Computers", Pearson Publishers, New Delhi, 2007.

REFERENCE

1. Gottfried Byron S, "Programming with C", Second Edition, Tata McGraw-Hill, New Delhi, 2006.
2. Kanetkar Yashavant P., "Let us C", Fifth Edition, BPB publications, New Delhi, 2005.
3. Schildt Herbert, "The Complete Reference C", Fourth Edition, Tata McGraw-Hill, New Delhi, 2000.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Outline the changes in hardware and software technologies with respect to evolution of computers and programming languages

CO2: Apply fundamental principles of problem solving techniques

CO3: Develop programs using basic programming principles of C language

CO4: Design simple applications using structured programming techniques and file concepts

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	2	1	1		1				2		1		
CO2	3	2	2		3					1			
CO3		3			3						2		
CO4		3			3								

3 – Substantial, 2 – Moderate, 1 – Slight

11EE201 CIRCUIT THEORY

(Common to ECE, EEE, EIE and Mechatronics Engineering)

3 1 0 4

MODULE – I **15**

DC Circuit Analysis: Ohms law, Temperature coefficient of resistors, resistors in series and parallel circuits, Kirchhoff‟s laws, Voltage and current division, Dependent and independent sources, source transformation, star delta transformation, mesh and nodal analysis for DC circuits. Steady state analysis of DC circuits.

Simple AC Circuits: Sinusoidal voltage and current, definitions, analysis of simple AC series and parallel circuits, RL,RC,RLC-concept of power and power factor

MODULE – II **15**

Three phase AC circuits: Three phase system- Relation between phase and line values in star and delta. Three phase balanced and unbalanced system- Three phase power measurement.

Network Theorems: Thevenin‟s and Norton‟s theorem, Superposition theorem, maximum Power Transfer theorem, Reciprocity theorem and Substitution theorem for DC and AC circuits.

MODULE- III **15**

Resonance Circuits: Series and Parallel Resonance, Frequency response, Quality factor and Bandwidth.

Transients in DC circuit: Transient of RL, RC, RLC circuit analysis with source free and forced (step) response.

Coupled Circuits: Mutual Inductance, Co efficient of coupling, dot convention, analysis of simple coupled circuits.

Lecture: 45, Tutorial: 15, TOTAL: 60

TEXT BOOKS

1. Sudhakar A and Shyam Mohan S.P, “Circuits and Network Analysis and Synthesis”, Tata McGraw-Hill, New Delhi, 2007.

REFERENCE BOOKS

1. Edminister Joseph A. and Nahri, Mahmood., “Electric Circuits”, Schaum‟s Series, Tata McGraw-Hill, New Delhi, 2007.
2. Arumugam, M and Premkumar, N., “Electric Circuit Theory”, Khanna Publishers, New Delhi, 1989.
3. Hayt William H., Kemmerly, Jack E. and Durbin ,Steven M., “Engineering Circuit Analysis”, Sixth edition, Tata McGraw –Hill, New Delhi, 2007.
4. Chakrabati, A., “Circuit Theory: Analysis and Synthesis”, Dhanpath Rai & sons, New Delhi, 1999.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Solve simple DC and AC circuits.
CO2: Apply network theorems to simplify the circuits.
CO3: Analyse poly phase, resonant and coupled circuits.

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3		3	2		1						1	
CO2	3	2	3	2									
CO3	3	2	2	3									

3 – Substantial, 2 – Moderate, 1 – Slight

11PH202 PHYSICAL SCIENCES LABORATORY – II

(Common to all Engineering and Technology branches)

0 0 3 1

PART - A: APPLIED PHYSICS LABORATORY

(Any five experiments)

LIST OF EXPERIMENTS /EXERCISES

1. Determination of band gap of a semiconductor material.
2. Determination of wavelength of mercury spectrum – spectrometer grating.
3. Determination of thermal conductivity of a bad conductor – Lee's Disc method.
4. Determination of hysteresis loss in a ferromagnetic material.
5. Determination of Young's modulus of the material – uniform bending.
6. Determination of viscosity of liquid – Poiseuille's method.

PART - B: APPLIED CHEMISTRY LABORATORY

(Any five experiments)

LIST OF EXPERIMENTS /EXERCISES

1. Estimation of Chloride in a given water sample.
2. Determination of Dissolved Oxygen in a sample of water / sewage.
3. Estimation of Chromium in Industrial waste water.
4. Estimation of Ferrous ion in rust solution.
5. Estimation of percentage of Copper present in brass.
6. Estimation of ferric ion by Spectrophotometeric method.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Determine the features of conducting materials

CO2: Familiarize the concepts of thermal conductivity

CO3: Estimate DO, chloride, chromium, ferrous ion and copper in wastewater

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3												
CO2	3												
CO3	3												

3 – Substantial, 2 – Moderate, 1 – Slight

11CS102 PROGRAMMING LABORATORY

(Common to all Engineering and Technology branches)

0 0 3 1

LIST OF EXPERIMENTS /EXERCISES

A) APPLICATION PACKAGES

1. To create an advertisement using word
2. To illustrate the concept of mail merging using word
3. To create a spread sheet to analyse the marks of the students of a class and also to create appropriate charts using excel
4. To create the presentation for the department using power point
5. To create the presentation for digital computers using power point

B) C PROGAMMING (ANY TWO PROGRAMS IN EACH SECTION)

6. Simple programs using decision making and branching:
   a. Program to find biggest of three numbers
   b. Design of simple menu driven calculator
   c. Program to find the roots of the quadratic equation
   d. Program to convert the given decimal number to binary
   e. Program to print the prime numbers between 100 to 500
   f. Program to print the electricity bill in a specified format applying specified rules
7. Programs using arrays:
   a. Program to find the biggest number in the array
   b. Menu driven program to insert and delete a specified element from the array
   c. Program to arranged the elements of the array in ascending order
   d. Program to merge given two one dimensional arrays and to remove the duplicates
   e. Program for multiplication of two matrices
8. String manipulations:
   a. Program to find the length of the string, copy one string to another and compare two strings, concatenate two strings without using library functions.
   b. Program to check whether the given string is a palindrome or not without reversing
   c. Program to find the occurrence of a substring in a main string and replace the substring by another string.
   d. Arranging the list of names in alphabetical order
   e. Program to count the number of occurrences of vowels, consonants, words, white spaces and special characters in the given statement.
9. Functions:
   a. Program to swap the contents of two variables using functions (Pass by address and pass by reference)
   b. Program to print the Fibonacci series using recursive function
   c. Program to print the average and standard deviation of the elements of the one- dimensional array using function.
   d. Program to print the transpose of a matrix using functions
   e. Menu driven program to perform string operations using functions
10. Structures and file operations:
    a. Define a structure to store the student details viz., Roll no, name, marks in three subjects, total, avg and class obtained. Read the first three fields and write your logic to calculate the total, average and class obtained for ten students. Print the results in the order of ran obtained.
    b. Structure based program to print the pay slip of an employee.
    c. Program using files to copy the contents of one file to another

REFERENCES / MANUALS/SOFTWARE:

Software requirements

Operating System : Windows / Linux

Compiler : C compiler

Packages: MS office or Equivalent

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: utilize the features of MS office package to create documents, presentation and reports

CO2: write and execute programs to illustrate decision making and branching

CO3: develop programs using 1D and 2D arrays

CO4: create programs for manipulating strings

CO5: demonstrate the use of functions and structures to develop applications

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1											3		
CO2	3	2			2								
CO3	3	2			2								
CO4	3	2			2								
CO5	3	1			3								

3 – Substantial, 2 – Moderate, 1 – Slight

11EE202 CIRCUITS LABORATORY

(Common to ECE, EEE and EIE)

0 0 3 1

LIST OF EXPERIMENTS /EXERCISES

1. Verification of Ohm‟s Laws and Kirchhoff‟s Laws.
2. Verification of Thevenin‟s and Norton‟s Theorem.
3. Verification of Superposition Theorem.
4. Verification of Maximum Power Transfer Theorem.
5. Verification of Reciprocity Theorem.
6. Transient response of RL and RC circuits (also using PSPICE).
7. Frequency response of Series and Parallel Resonance Circuits (also using PSPICE).
8. Study of Frequency response of Single and double Tuned coupled Circuits.
9. Measurement of real power, reactive power, power factor and impedance of RC, RL and RLC Circuits.
10. Power measurement in a three phase circuit by two Watt meters.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Analyse the electric circuits by applying various theorems

CO2: Measure the real and reactive power in AC circuits.

CO3: Develop DC and AC circuits using Simulation tools

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3	3	2	3									
CO2	3	3	3	3		1							
CO3	1	3	3	1	3								

3 – Substantial, 2 – Moderate, 1 – Slight

11MA301 ENGINEERING MATHEMATICS – III

(Common to all Engineering and Technology branches)

3 1 0 4

MODULE – I **15**

Fourier Series: Dirichlet‟s conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Change of interval - Parseval‟s Identity - Harmonic analysis.

MODULE - II **15**

Partial Differential Equations: Formation – By elimination of arbitrary constants and arbitrary functions – Standard types– Lagrange‟s linear equation- Linear partial differential equations of second order with constant coefficients.

Applications of Partial Differential Equations: Classification of second order quasi linear partial differential equations – Solutions of one dimensional wave equation – One dimensional heat equation – Steady state solution of two-dimensional heat equation (Insulated edges excluded).

MODULE - III **15**

Fourier transform: Fourier integral theorem (Statement only) – Fourier transform pair – Properties – Transforms of simple functions – Sine and Cosine transforms – Convolution theorem and Parseval‟s identity (Statement only).

Z-transform: Elementary properties – Transforms of simple functions - Inverse Z – transform(Partial Fraction Method and Residue method) – Convolution theorem (Statement Only) – Solution of Difference Equations.

Lecture : 45, Tutorial : 15, TOTAL : 60

TEXT BOOKS

1. Kandasamy, P., Thilagavathy, K., and Gunavathy, K., “Engineering Mathematics”, Volume - III, S. Chand & Co, New Delhi, 2008.
2. Veerarajan, T., “Engineering Mathematics”, Tata McGraw-Hill, New Delhi, Reprint 2010.

REFERENCE BOOKS

1. Grewal, B.S., “Higher Engineering Mathematics”, Thirty Sixth Edition, Khanna Publishers, New Delhi, 2007.
2. Wylie, C. Ray and Barrett, Louis, C., “Advanced Engineering Mathematics”, Sixth Edition, McGraw-Hill, New York, 2004.
3. Andrews, L. A. and Shivamoggi, B. K., “Integral Transforms for Engineers and Applied Mathematicians”, Macmillan, New York, 2004.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Utilize Fourier series to solve engineering problems.

CO2: Formulate and solve higher order partial differential equations.

CO3: Interpret the basic knowledge of Fourier transforms and Z-transforms in engineering field.

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3	3		1	2							1	
CO2	3	3		2	2							1	
CO3	3	3		1	2							1	

1 – Slight, 2 – Moderate, 3 – Substantial

11EI301 ELECTRICAL MEASUREMENTS AND INSTRUMENTS

3 1 0 4

MODULE – I **15**

Measurement of Voltage, Current, Energy and Power: Operating forces of Analog Instruments. Principle, construction, operation, torque equation, application of D‟Arsonval galvanometer,. Principle, construction, operation and comparison of moving coil, moving iron meters, dynamometer type ammeter, voltmeters, Wattmeters, induction type – Energy meters. Errors and its compensation, Phantom loading– LPF wattmeter - Calibration of energy meter and wattmeter. Measurements using CRO.

MODULE - II **15**

Potentiometers and Instrument Transformers: DC potentiometer – Basic circuit and standardization – Crompton‟s DC potentiometer – AC potentiometer – Drysdale polar type and Gall-Tinsley coordinate type AC potentiometer: Theory, limitations and applications. Current Transformer and Potential Transformer: construction, theory, operation, phasor diagram, characteristics, error elimination and its applications.

MODULE - III **15**

Measurement of Resistance, Inductance and Capacitance: Measurement of low medium and high resistance: Wheatstone bridge – Kelvin double bridge – Substitution method– High resistance measurement – Megger – Earth resistance measurement- Fall of potential method. A.C bridges: Measurement of inductance and capacitance – Maxwell Bridge – Wein‟s bridge – Hey‟s bridge – Schering bridge – Anderson bridge – Campbell bridge to measure mutual inductance – Errors in A.C. bridge methods and their compensation.

Lecture:45, Tutorial:15, TOTAL : 60

TEXT BOOKS

1. Sawhney, A.K., “Electrical and Electronic Measurements and Instrumentation”, Dhanpath Rai & Co (P) Ltd, New Delhi, 2004.
2. Gupta, J.B., “A Course in Electronic and Electrical Measurements and Instrumentation”, S.K. Kataria & Sons, Delhi, 2003.

REFERENCE BOOKS

1. Golding, E.W. and Widdis F.C., “Electrical Measurements and Measuring Instruments”, A.H.Wheeler & Co, 1994.
2. Kalsi, H.S., “Electronic Instrumentation”, Tata McGraw Hill, New Delhi, 1995.
3. https://www.youtube.com/watch?v=xLjk5DrScEU&list=PLt5syl71JKf0IacRzLI-02Q_udP4nJiJg
4. http://nptel.ac.in/courses/108105064/
5. http://nptel.ac.in/courses/108105053/42

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Understand the facts in measurement techniques for current, voltage, power and energy.
CO2: Analyze the operation of potentiometer and Instrument transformers
CO3: Get familiar with the measurement methods of inductance and capacitance using Bridges.
CO4: Estimate the unknown electrical parameters with the measurement

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3												
CO2	3												
CO3	3												
CO4	3				3								

1 – Slight, 2 – Moderate, 3 – Substantial

11EI302 TRANSDUCER ENGINEERING

3 0 0 3

MODULE – I **15**

Science of Measurements and Characteristics of Transducers: Measurement systems-Units and Standards – Calibration methods: Static calibration – Classification of Errors: Error analysis, Statistical methods – Classification of transducers. Static characteristics: Accuracy, Precision, Resolution, Sensitivity, Linearity, Hysteresis, Range and Span. Dynamic characteristics: Mathematical model of Zero, I and II order transducers and response to impulse, step and ramp inputs.

MODULE - II **15**

Variable Resistance, Inductance and Capacitive Transducers: Principle of operation, Construction details, Characteristics and Application of Resistance Potentiometer, Strain gauge, Resistance Thermometer, Thermistor and Hot-wire anemometer - Piezoresistive sensor - Humidity sensor.Variable reluctance transducers – Linear Variable Differential Transformer. Capacitive transducer and types –Capacitor microphone.

MODULE - III **15**

Other Transducers: Piezoelectric transducer – Magnetostrictive transducer –Vibration sensor – Proximity Sensor-Photoelectric Tachometer - Hall Effect Transducer - Home appliance sensor– Fibre optic transducer – Digital transducers - IC sensor(Temperature and Pressure) – Smart sensor – Introduction to MEMS.

TOTAL : 45

TEXT BOOKS

1. Ranganathan, S., "Transducer Engineering", Allied Publishers, New Delhi, 2003
2. Murthy, D.V.S, "Transducers and Instrumentation", Prentice Hall of India, New Delhi, 2001.

REFERENCE BOOKS

1. Doebelin, E. A., "Measurement Systems: Applications and Design", Tata McGraw-Hill, New Delhi, 2003
2. Sawhney, A.K., "A Course in Electrical and Electronic Measurement and Instrumentation", Dhanpat Rai & Co (P) Ltd., New Delhi, 2005.
3. Patranabis D, "Sensors and Transducers", Prentice Hall of India, New Delhi, 1999
4. nptel.ac.in/courses/108105064/
5. nptel.ac.in/courses/108105064/34

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Gain the basic knowledge in measurements and the characteristics of Transducers.

CO2: Understand the operation and construction of Variable resistance, Inductance and capacitance Transducer.

CO3: Get exposed to different transducers and its applications.

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3											1	
CO2	3		2									1	
CO3	3											1	

1 – Slight, 2 – Moderate, 3 – Substantial

11EI303 ELECTRON DEVICES AND CIRCUITS

3 0 0 3

MODULE – I **15**

PN Junction Diode and Bipolar Junction Transistor: Semiconductors –Intrinsic and Extrinsic semiconductor –PN junction diode theory – Current equation – Volt-Ampere characteristics- Transition and diffusion capacitance – Switching times of Diode. Transistor construction, Operation, CB, CE and CC configuration - input/output characteristics – Transistor current components, Operating point – Stability and stability factor: Fixed bias circuits and Voltage-divider bias(elementary problems) - Hybrid model of BJT-Analysis of CE configuration.

MODULE – II **15**

Other Semiconductor Devices: Construction, Volt-Ampere characteristics and applications: JFET – Insulated Gate FET (MOSFET) types: Depletion type and enhancement type - Silicon controlled rectifier –DIAC-TRIAC – UJT.
Zener diodes – Tunnel Diodes- Light emitting diodes, LCD – Seven segment displays - Photo diode and Photo transistor – Opto isolators - Solar Cell.

MODULE - III **15**

Applications: Diode applications: Half wave and Full wave rectifiers (elementary problems) – Clippers, Clampers and Voltage multiplier. - Differential amplifier - RC coupled amplifier- Operation and efficiency of Class A, Class B, Class C and push pull amplifier (elementary problems). Feedback amplifiers: Voltage Series feedback amplifiers, Voltage Shunt feedback amplifiers, Current Series and Current Shunt– Oscillators: Phase shift, Wien Bridge, Hartley and Colpitts Oscillator. Transistor as switch. Multivibrators- Monostable and astable multivibrators- Schmitt trigger – voltage regulators: Series and Shunt regulators.

Lecture: 45

TEXT BOOKS

1. Malvino., “Electronic Principles”, Tata McGraw-Hill, New Delhi, 2009.
2. Sedha R.S., “A Text book of Applied Electronics”, S.Chand Publications Ltd., New Delhi, 2009.

REFERENCE BOOKS

1. Bell David A., “Electronic Devices and Circuits”, Fourth Edition, Prentice Hall of India, New Delhi, 2009
2. Boylestad and Nashelsky., “Electronic Devices and Circuit Theory”, Sixth Edition, Prentice Hall of India, New Delhi, 2009.
3. Salivahanan. S, Suresh Kumar. N and Vallavaraj A., “Electronic Devices and Circuits”, Tata McGraw-Hill, New Delhi, 2009.
4. https://www.youtube.com/watch?v=9CrcRabTQ0s
5. https://www.youtube.com/watch?v=UIEGKvCfDOA

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Know the basics of semiconductor devices and the electronic circuits using diodes and transistors
CO2: Discuss the other types of semiconductor devices and their operation
CO3: Exercise the elementary problems in Biasing, gain in amplifiers and rectifiers using semiconductor devices
CO4: Explain the applications of diode and transistor

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3				2							2	
CO2	3				2							2	
CO3	3		3		3							2	
CO4	1		3		3							2	

1 – Slight, 2 – Moderate, 3 – Substantial

11EI304 DIGITAL LOGIC CIRCUITS

(Common to EEE and EIE branches)

3 1 0 4

MODULE-I **15**

Boolean Algebra and Combinational Logic: Binary Numbers- Number Base Conversion- Signed Binary Numbers- Definitions of Boolean Algebra- Basic Theorems- Boolean functions- Canonical and standard forms- Digital Logic Gates. Combinational circuits- Analysis Procedure-Design Procedure- Gate Level minimization- Map Method-Tabulation Method – Don‟t care condition- NAND and NOR Implementation- Adders/Subtractors- Decoder-Encoder-Multiplexer-Demultiplexer - HDL introduction

MODULE-II **15**

Synchronous Sequential Logic: Flip flops SR, JK, T, D and Master slave – Characteristic and excitation tables and equations – Level and Edge Triggering –Realization of one flip flop using other flip flops – Analysis and design of sequential circuits with state diagram, State table, State minimization and State assignment-Ripple counters –Design of Synchronous counters, Ring counters and Sequence detector - Registers – shift registers- Universal shift register.

MODULE-III **15**

Asynchronous Sequential Logic and Digital IC's: Analysis of Asynchronous Sequential – primitive state / flow table – Minimization of primitive state table –state assignment – Excitation table - cycles – Races –Hazards: Static –Dynamic –Essential –Hazards elimination.

RTL and DTL Circuits- Transistor-Transistor Logic – Emitter Coupled Logic- Noise Margin - CMOS Logic - Classification of memories –RAM organization – Static RAM Cell-Bipolar RAM cell – MOSFET RAM cell –Dynamic RAM cell –ROM organization - PROM –EPROM –EEPROM .

Lecture: 45 , Tutorial :15, TOTAL : 60

TEXT BOOKS

1. Mano,M Morris; Ciletti,Michael.D, "Digital Design", Fourth Edition, Pearson Education India, 2008.
2. Givone, Donald D., "Digital Principles and Design", Tata McGraw-Hill, New Delhi, 15th reprint 2009.

REFERENCES BOOKS

1. John, M Yarbrough, "Digital Logic Applications and Design", Thomson Publications, New Delhi, 2007.
2. Roth, Charles, H., "Fundamentals of Logic Design", Thomson Publication Company, Singapore, 2003.
3. Floyd, „Digital Fundamentals", Eighth Edition, Pearson Education, New Delhi, 2003.
4. Wakerly John F., „Digital Design: Principles and Practice", Third Edition, Pearson Education, New Delhi, 2002.
5. http://nptel.ac.in/courses/117105080/
   http://nptel.ac.in/courses/117106086/1
   http://www.nptelvideos.in/2012/12/digital-circuits-and-systems.html

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Understand the correlation between boolean expression and logic gates. Impart knowledge in designing of various combinational logic circuits.

CO2: Learn about the flip flops for analyzing and designing the sequential circuits. Gain the adequate design knowledge of counters and registers.

CO3: Analyze the various asynchronous circuits and Hazards.

CO4: Know about various memory devices

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3		3		3							2	
CO2	3		3		2								
CO3	3												
CO4	3												

1 – Slight, 2 – Moderate, 3 – Substantial

11CS301 DATA STRUCTURES AND ALGORITHMS

(Common to EIE and CSE branches)

3 1 0 4

MODULE – I **15**

Linear Structures : Abstract Data Type (ADT) – The List ADT – The Stack ADT – The Queue ADT Trees-Preliminaries – Binary Trees – The Search Tree ADT – Binary Search Trees – AVL Trees – Tree Traversals – Hashing – General Idea – Hash Function – Separate Chaining – Open Addressing – Linear Probing

MODULE - II **15**

Tree Structure and Sorting: Priority Queues (Heaps) – Model – Simple implementations – Binary Heap-d Heaps. Sorting-Preliminaries – Insertion Sort – Shellsort – Heapsort – Mergesort – Quicksort – External Sorting

MODULE - III **15**

Graphs: Graphs-Definitions – Topological Sort – Shortest-Path Algorithms – Unweighted Shortest Paths – Dijkstra‟s Algorithm – Minimum Spanning Tree – Prim‟s Algorithm – Applications of Depth-First Search – Undirected Graphs – Biconnectivity – Introduction to NP-Completeness

Lecture: 45, Tutorial: 15, TOTAL: 60

TEXT BOOKS

1. Weiss M. A., “Data Structures and Algorithm Analysis in C”, 3rd edition, Pearson Education Asia, New Delhi, 2006.
2. Aho A.V., Hopcroft, J.E. and Ullman J.D., “Data Structures and Algorithms”, Pearson Education, New Delhi, 2003.

REFERENCE BOOKS

1. Langsam, Y., M., Augenstein J. and Tenenbaum, A. M., “Data Structures using C”, Pearson Education Asia, New Delhi, 2004.
2. Baase Sara and Van Gelder Allen, “Computer Algorithms: Introduction to Design and Analysis”, Pearson Education Asia, New Delhi, 2003.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: understand the different methods of organizing large amounts of data

CO2: implement various algorithmic techniques

CO3: efficiently implement the different data structures solutions for specific problems

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	1	2	2			1							
CO2		2	3										
CO3		2	3	2		2							

1 – Slight, 2 – Moderate, 3 – Substantial

11EC308 DEVICES AND CIRCUITS LABORATORY

0 0 3 1

LIST OF EXPERIMENTS /EXERCISES

1. Characteristics of pn junction diode and Zener diode
2. Characteristics of CE transistor and determination of its hybrid parameters
3. Characteristics of Half wave and Full wave rectifier
4. Clipper and Clamper circuits.
5. Hartley oscillator & Colpitts oscillator
6. Monostable and astable multivibrator.
7. Schmitt trigger
8. Characteristics of Shunt regulators
9. Characteristics of UJT and its application as a relaxation oscillator.
10. Characteristics of SCR
11. Characteristics of FET
12. Photodiode, Phototransistor characteristics and study of light activated relay circuit.
13. Solar cell and opto coupler characteristics.
14. PSPICE modeling of electronic circuits

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Analyze the characteristics of Semiconductor devices

CO2: Understand the circuit based on Diodes and Transistor

CO3: Get exposed to the operation of multi vibrators and oscillators

CO4: Implement the electronic circuit design using PSPICE

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1		3			2								
CO2		3			2								
CO3		3											
CO4		3	3								3		

1 – Slight, 2 – Moderate, 3 – Substantial

11CS305 DATA STRUCTURES AND ALGORITHMS LABORATORY

(Common to ECE, EIE and CSE**)**

0 0 3 1

LIST OF EXPERIMENTS /EXERCISES

1.Linked list implementation of Stack ADT
2.Infix to Postfix Conversion Using Stack
3.Implement the application for „Evaluating Postfix Expressions‟ using array of Stack ADT
4.Queue ADT
5.Implementation of Singly Linked List and Doubly Linked List
6.Implementation of Binary Search Tree
7.Array based Implementation of Circular Queue
8.Quick Sort
9.Heap Sort
10.Implementation of Dijkstra‟s Algorithm to find Shortest Path

REFERENCES / MANUALS /SOFTWARE :

1. Windows-Operating System
2. C -Compiler

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Implement solutions for specific problems with appropriate data structures using C.

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1		2	2	3									

1 – Slight, 2 – Moderate, 3 – Substantial

11EI305 TRANSDUCERS AND MEASUREMENTS LABORATORY

0 0 3 1

LIST OF EXPERIMENTS

1. Loading effect of potentiometer and measurement of displacement using LVDT.
2. Characteristics of Hall effect transducers.
3. Measurement of strain using strain gauge & load cell.
4. Measurement of speed using using photoelectric tachometer & proximity sensor.
5. Measurement of temperature using Thermocouple and Thermistor and Step Response characteristics of Resistance Temperature Detector.
6. Characteristics of vibration analyzer.
7. Range Extension for DC Ammeter and Voltmeter.
8. Calibration of Energy meter using Direct Loading.
9. Measurement of current using CT.
10. Measurement of resistance using Wheatstone‟s bridge and Kelvin‟s Double bridge.
11. Measurement of Capacitance and Inductance using Schering & Anderson bridge.
12. Study and measurement using CRO and DSO.

REFERENCES:

1. http://vlabs.iitkgp.ernet.in/be/
2. http://iitg.vlab.co.in/?sub=61&brch=174

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Perform the measurements of different physical parameters

CO2: Analyze the characteristics of electrical quantities

CO3: Determine the resistance and capacitance using bridge circuits

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1		3										2	
CO2		3										2	
CO3	3	2										2	

1 – Slight, 2 – Moderate, 3 – Substantial

11MA401 NUMERICAL METHODS

(Common to all Engineering and Technology branches except ECE & CSE)

3 1 0 4

MODULE - I **15**

Linear Algebraic Equations: Method of false position - Newton‟s method - Solution of linear system of equations by Gaussian elimination and Gauss - Jordan methods – Iterative methods: Gauss Jacobi and Gauss – Seidel methods.

Interpolation: Newton‟s forward and backward difference formulae – Bessel‟s formula - Lagrange‟s interpolation formula - Newton‟s divided difference formula.

MODULE - II **15**

Numerical Differentiation: Differentiation Using Newton‟s forward , backward and divided difference interpolation formula - Single step Methods - Taylor Series, Euler and Modified Euler methods - Fourth order Runge-Kutta method for solving first order equations - Multistep methods – Milne‟s and Adam‟s predictor and corrector methods.

Numerical Integration: Trapezoidal rule – Simpson‟s 1/3 – Double integrals using Trapezoidal and Simpson‟s rules.

MODULE - III **15**

Boundary Value Problems in PDE: Finite difference approximations to partial derivatives - Two dimensional Laplace equations - Poisson equations – One dimensional heat equation by implicit and explicit methods – One dimensional wave equation.

Lecturer: 45, Tutorial: 15, TOTAL: 60

TEXT BOOKS

1. Kandasamy, P., Thilakavathy, K. and Gunavathy, K., “Numerical Methods”, S.Chand & Co, New Delhi, reprint 2010.
2. Venkatraman, M. K, “Numerical Methods”, National Publishing Company, Chennai, 2000.

REFERENCE BOOKS

1. Balagurusamy, E., “Numerical Methods”, Tata McGraw-Hill, New Delhi, 1999.
2. Jain, M. K., Iyengar, S. R. K. and Jain, R. K., “Numerical Methods for Scientific and Engineering Computation”, Fourth Edition, New Age International (P) Ltd., New Delhi, 2006.
3. Sankara Rao, K., “Numerical Methods for Scientists and Engineers”, Second Edition, Prentice Hall India, New Delhi, 2004.
4. Thangaraj, P, “Computer – Oriented Numerical Methods”, Prentice Hall of India, New Delhi, 2008.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Discuss the various methods of solving linear algebraic and transcendental equations

CO2: Estimate the intermediate values using interpolation concepts.

CO3: Interpret the knowledge of numerical differentiations and integration

CO4: Apply various numerical techniques in solving complex partial differential equations.

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3	3		1	2							1	
CO2	3	3										1	
CO3	3	3		1	2							1	
CO4	3	3		1	2							1	

1 – Slight, 2 – Moderate, 3 – Substantial

11EC408 COMMUNICATION ENGINEERING

(Common to EEE and EIE branches)

3 0 0 3

MODULE - I **15**

Analog Modulation Systems: Principles of amplitude modulation – AM envelope, frequency spectrum and bandwidth, modulation index and percentage modulation, AM power distribution, AM modulator circuits – low level AM modulator, AM transmitters – low level transmitters, high level transmitters. AM reception: AM receivers – TRF, Superheterodyne receivers, Double Conversion AM receivers (Block Diagrams only). Angle Modulation – FM and PM waveforms, phase deviation and modulation index, frequency deviation, frequency modulators and demodulators, frequency spectrum of a angle modulated waves, Bandwidth requirement, Average power FM – Direct FM, Direct FM transmitter, Indirect FM transmitter, Angle modulation Vs. amplitude modulation.FM receivers: FM demodulators, PLL FM demodulators, Frequency Vs. phase Modulation (Block Diagrams only).

MODULE - II **15**

Digital Communication and Network Protocol: Time Division Multiplexing, Digital T-carrier System – Pulse code modulation –Digital modulation: Amplitude shift keying, Frequency and phase shift keying – Modulator and demodulator, bit error rate calculation. Data Communication codes, error control. Serial interface-RS232, RS485, CAN bus, ISDN, LAN, ISO-OSI seven layer architecture for WAN.

MODULE - III **15**

Satellite & Optical Communications and Wireless Technologies: Satellite Orbits – Satellite Communication Systems-Optical Principles – Optical Communication Systems – fiber-Optic Cables – Single mode and multi mode-step index fibers – Optical Transmitters – LED – LASER and Receivers – PIN Diode – Avalanche Photo Diode (APD) . Cellular Telephones Systems – Cellular Concepts – Second generation (2G) and Third generation (3G) cell phone systems –PANs and Bluetooth-Zigbee and Mesh Wireless Networks-Infrared Wireless networks.

TEXT BOOKS

1. Tomasi Wayne, "Electronic Communication Systems", Third Edition, Pearson Education, New Delhi, 2005.
2. Frenzel Louis E., "Principles of Electronics Communication Systems", Third Edition, Tata McGraw-Hill, New Delhi, 2008.

REFERENCE BOOKS

1. Anokh Singh, "Principles of Communication Engineering", S.Chand & Co., New Delhi, 2006.
2. Kennedy G., "Electronic Communication Systems", Fourth Edition, McGraw-Hill, New York, 2002.
3. Miller, „Modern Electronic Communication", Prentice Hall of India, New Delhi, 2003.
4. Blake Roy., "Electronic Communication Systems", Second Edition, Thomson Delmar, Singapore, 2002.
5. http://dl4a.org/uploads/pdf/Communication%20Systems%20Engineering(2nd%20Edition).pdf

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Understand the basic signals, analog modulation, demodulation and radio receivers
CO2: explain the characteristics and model of transmission medium
CO3: understand data communication system and techniques

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3												
CO2	3		2					3					
CO3			1					3			3		

1 – Slight, 2 – Moderate, 3 – Substantial

11EI401INDUSTRIAL INSTRUMENTATION - I

3 0 0 3

MODULE - I **15**

Measurement of Pressure: Units of pressure - Manometers – Different types – Elastic type pressure gauges – Bourdon type - bellows – Diaphragms. Electrical methods: Elastic elements with LVDT and strain gauges – Capacitive type pressure gauge – Piezo resistive pressure sensor – Resonator pressure sensor. Measurement of vacuum: McLeod gauge – Thermal conductivity gauges – Ionization gauge, cold cathode and hot cathode types. Testing and Calibration of pressure gauges – Dead weight tester. Measurement of Force: Electric balance – Different types of load cells – Magnets – Elastic load cells - Strain gauge load cell

MODULE - II **15**

Measurement of Temperature: Definitions and Standards – Primary and secondary fixed points. Calibration of thermometer. Different types of filled in system thermometer – Sources of errors in filled in systems and their compensation – Bimetallic thermometers. Electrical methods of temperature measurement. Signal conditioning of industrial RTDs and their characteristics – Three lead and four lead RTDs. Thermocouples: Laws of thermocouple – Fabrication of industrial thermocouples – Signal conditioning of thermocouple output – Thermal block reference functions

– Commercial circuits for cold junction compensation – Response of thermocouple – Special techniques for measuring high temperature using thermocouples. Radiation fundamentals- Radiation methods of temperature measurement: Total radiation and selective radiation pyrometers – Optical pyrometer – Two colour radiation

MODULE- III **15**

Measurement of Torque, Velocity, Acceleration, Vibration and Density: Different methods of torque measurement: Strain gauge, relative regular twist. Speed measurement: Revolution counter – Capacitive tacho-drag cup type tacho – D.C and A.C tacho generators – Stroboscope. Accelerometers: LVDT, piezoelectric, strain gauge and variable reluctance type accelerometers. Mechanical type vibration instruments – Seismic instrument as an accelerometer and vibrometer – Calibration of vibration pick-ups. Units of density, specific gravity and viscosity used in industries: Baume scale, API scale. Densitometer: Pressure head, Float, Ultrasonic types- Bridge type gas densitometer.

TOTAL: 45

TEXT BOOKS

1. Doebelin, E.O., “Measurement Systems” Application and Design”, Tata McGraw Hill, New Delhi, 2003.
2. Krishnaswamy, K. and Vijayachitra, S., “Industrial Instrumentation”, New Age International Publications, New Delhi, 2004.

REFERENCE BOOKS

1. Jain, R.K., “Mechanical and Industrial Measurements", Khanna Publishers, New Delhi,1999.
2. Patranabis, D., “Principles of Industrial Instrumentation”, Tata McGraw-Hill New Delhi, 1996.
3. Singh, S.K., “Industrial Instrumentation and Control”, Tata McGraw-Hill, New Delhi, 2003.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: To study the different types industrial instruments for measuring pressure parameter.

CO2: To study the different types industrial instruments for measuring temperature parameter.

CO3: To study the different types industrial instruments for measuring the parameters such as Torque,

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3		2									3	
CO2	3		2									3	
CO3	3		2									3	

3 – Substantial, 2 – Moderate, 1 – Slight

11EI403 ANALOG INTEGRATED CIRCUITS

(Common to EEE and EIE branches)

3 0 0 3

MODULE -I **15**

Characteristics of Operational Amplifier: Introduction – Basic information of operational amplifier, Ideal operational amplifier, operational amplifier internal circuit - analysis of differential amplifiers with active loads– Characteristics of OP AMP –Open Loop OP AMP –DC characteristic- input bias current-input offset voltage - thermal drift - AC characteristic - Frequency response of OP AMP – Slew Rate, stability - frequency compensation.

MODULE – II **15**

Applications of Operational Amplifiers: Basic Op-amp applications - Inverting and Non inverting Amplifiers- Instrumentation amplifier- Voltage to current converter – current to Voltage converter - Precision rectifier - sample and hold circuits- Log and Antilog Amplifiers – Multiplier and Divider - Differentiator- Integrator- Comparator- Multivibrators and Schmitt trigger- Sine wave Oscillator- Triangular wave generator- I and II order Low-pass and high-pass Butterworth filters - Switched capacitor filter - A/D converter-Flash- Dual slope-Successive approximation D/A converter: weighted resistor type, R-2R ladder and inverted R-2R ladder.

MODULE– III **15**

Analog Multiplier, PLL and Special Function IC'S: Basic Principles – Phase Detector/comparator Voltage controlled Oscillator- Monolithic PLL – PLL Applications: Frequency Multiplication/Division, Translation and FSK Demodulation. Description of Functional Diagram of IC 555 timer- Monostable Multivibrator - Astable Multivibrator using 555 Timer- Voltage regulators: Series op-amp Regulator – IC Voltage regulator – 723 General Purpose Regulator – Switching Regulator.

TOTAL:45

TEXT BOOKS

1. Roy Choudhry, D and Shail Jain, "Linear Integrated Circuits", New Age International, New Delhi, 2007
2. Gaykwad, Ramakant A., "OP-AMP and Linear IC"s", Pearson Education, New Delhi, 2004.

REFERENCE BOOKS

1. Sergio Franco., "Design with Operational Amplifiers and Analog Integrated Circuits", McGraw-Hill, New York, 1997.
2. Coughlin Robert and Driscoll F, "Operational Amplifiers and Linear Integrated Circuits", Sixth Edition, Pearson Education Asia, 2001.
3. http://nptel.ac.in/courses/117107094/17
4. http://www.d.umn.edu/~htang/ECE5211_doc_files/ECE5211_files/Chapter2.pdf
5. nptel.ac.in/courses/117106030/nptel-aic/analogicdesign-intro.pdf

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Understand the characteristics and applications of operational amplifier

CO2: Ability in designing with operational amplifier

CO3: Gain fundamental knowledge on functional concepts of Analog Multiplier PLL, special functional ICs and its design

CO4: Realize the applications of PLL, special functional ICs

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3		3		3							3	
CO2	3		3		2							3	
CO3	3				3								
CO4	2				3								

1 – Slight, 2 – Moderate, 3 – Substantial

11EE301 ELECTRICAL MACHINES

(Common to Mechatronics, ECE, EIE and Chemical)

3 1 0 4

MODULE - I **15**

DC Machines: DC Generator: Constructional details – EMF equation – Methods of excitation – Self and separately excited generators – Characteristics of series, shunt and compound generators – Principle of operation of DC motor – Back emf and torque equation – Characteristics of series, shunt and compound motors - Starting of DC motors – Types of starters – Speed control of DC shunt motors- Applications.

MODULE –II **15**

Transformers: Construction – Principle of operation – EMF equation — Equivalent circuit – Transformer on load – Regulation Transformer Testing: Load test, open circuit and short circuit tests- Auto transformers.

Alternator: Construction of Synchronous Generators – Principles-EMF equation- Voltage regulation- EMF and MMF methods.

MODULE -III **15**

Induction Motors: Construction – Types – Principle of operation of three-phase induction motors –Starting and speed control – Single-phase induction motors - Applications.

Synchronous Motor: Construction-Principle- Methods of starting of synchronous motors

Electric Drives: Basic Elements of electric drive – Types of Electric Drives – factors influencing the choice of electrical drives –Classes of duty – Selection of motors for various industrial applications: Textile mills, Steel rolling mills, Cement mills, Machine tools.

Lecture: 45, Tutorial: 15, TOTAL: 60

TEXT BOOK

1. Theraja, B.L and Theraja, A.K., "A Text Book of Electrical Technology", Volume-II, S. Chand & Co, New Delhi, 2008.
2. Vedam Subramaniyam, "Electric Drives: Concepts and Applications", Tata McGraw-Hill, New Delhi, 2004.

REFERENCE BOOKS

1. Rajput, R. K., "Electrical Machines", Third Edition, Laxmi Publications (P) Ltd, New Delhi, 2002.
2. Kothari, D. P and Nagrath, I. J, "Basic Electrical Engineering", Second Edition, Tata McGraw-Hill, New Delhi, 2002.
3. Bhattacharya, S.K., "Electrical Machines", Second Edition, Tata McGraw-Hill, New Delhi, 1998.
4. Mittle, V.N. and Mittle, Aravinth., "Basic Electrical Engineering", Second Edition, Tata McGraw-Hill, New Delhi, 2007.
5. www.electrical4u.com
6. www.electricaltechnology.org
7. www2.isu.edu/estec/ic-ed-modules/Module-3-AC-Generators-Transformers-AC-Motors.pdf
8. www.uotechnology.edu.iq/dep-electromechanic

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Understand the construction and working principles of DC Machines and their characteristics.

CO2: understand the construction and working principles of AC Machines and their characteristics

CO3: select of electrical drives for various applications.

CO4: determine the voltage, current, speed, power, torque and efficiency for the electrical machines

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3			2									
CO2	3			2									
CO3	3			2									
CO4	3		3	2	3								

1 – Slight, 2 – Moderate, 3 – Substantial

11ME408 THERMODYNAMICS AND FLUID MECHANICS

(Common to EEE and EIE)

3 1 0 4

MODULE - I **15**

Laws of Thermodynamics: Thermodynamic systems – Boundary – Control volume – System and surroundings – Universe – Properties – State-process – Cycle – Equilibrium – Work and heat transfer – Point and path functions – First law of thermodynamics for open and closed systems – First law applied to a control volume – SFEE equations [steady flow energy equation] – Second law of thermodynamics – Heat engines – Refrigerators and heat pumps. **Gas Turbines:** Open and closed cycle gas turbines – Ideal and actual cycles – Brayton cycle – Cycle with reheat, inter-cooling and regeneration – Application of gas turbines

MODULE - II **15**

Steam Generation: Formation of steam – Properties of steam – Use of steam tables and charts – Steam power cycle (Rankine) – Layout diagram and working principle of a steam power plant - Mountings and accessories – Boiler Instrumentation - Boiler energy losses - Steam traps – Total energy schemes –Prime movers for total energy system

Refrigeration and Air Conditioning: Unit of refrigeration – Basic functional difference between refrigeration and air conditioning – Various methods of producing refrigerating effects (RE) – Vapour compression cycle: P-H and T-S diagram(Qualitative treatment only)- -Vapour absorption system – Air conditioning systems – Basic psychrometry – Simple psychrometric processes – Types of air-conditioning systems – Sensible heat exchange processes. Latent heat exchange processes

MODULE - III **15**

Fluid Machineries:

Hydro turbines: definition and classifications - Pelton turbine - Francis turbine - propeller turbine - Kaplan turbine - working principles - efficiencies -performance curve. **Compressors**: Positive displacement compressors – Reciprocating compressors – Indicated power – Clearance volume – Various efficiencies – Clearance ratio – Volume rate – Conditions for perfect and imperfect inter-cooling(Qualitative treatment only) – Multi stage with inter-cooling. **Pumps :** classifications - Reciprocating pump, Centrifugal pump: classifications, working principle, performance curves - rotary pumps: working principles of gear and vane pumps – Energy conservation measures in pumps and compressors

Lecture: 45, Tutorial: 15, TOTAL: 60

TEXT BOOKS

1. Rajput, R. K., "Thermal Engineering", S. Chand & Co, New Delhi, 2000
2. Bansal, R.K., "Fluid Mechanics and Hydraulic Machines", Fifth Edition, Laxmi Publications, New Delhi, 1995.

REFERENCE BOOKS

1. Rogers, C and Mayhew, Y R., "Engineering Thermodynamics: Work and Heat Transfer", Addison Wesley, New Delhi, 1999.
2. Nag, P. K., "Basic and Applied Engineering Thermodynamics", Tata McGraw-Hill, New Delhi, 2002.
3. Mathur, M.L. and Metha, F.S., "Thermal Engineering", Jain Brothers, New Delhi, 1997.
4. Cengel, Yunus A. and Cimbala, John M., "Fluid Mechanics Fundamentals and Applications", Tata McGraw-Hill, New Delhi, 2006.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Understand the laws of thermodynamics and gas turbines

CO2: Provide the properties of steam and different types of air conditioning systems.

CO3: Classify the various fluid machineries and its working principles

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3			2									
CO2	3			3									
CO3	3			3									

1 – Slight, 2 – Moderate, 3 – Substantial

11EI404 ANALOG AND DIGITAL INTEGRATED CIRCUITS LABORATORY

0 0 3 1

LIST OF EXPERIMENTS

1. Verification of truth table for AND, OR, XOR, NOT, NOR, NAND, JK FF, RS FF, D FF
2. Design of Half , Full adder and subtractor circuits
3. Code converters, Parity generator and parity checker
4. Encoders and Decoders
5. Design and implementation of 4-bit modulo counters
6. Design and implementation of 4-bit shift registers
7. Study of 4:1 multiplexer and 1:4 demultiplexer
8. Op-Amp as Adder, Comparator
9. Op-Amp as Integrator and Differentiator
10. Study of NE/SE 555 timer in Astable and Monostable modes
11. a) Voltage to frequency characteristics of NE/ SE 566 IC
    b) Frequency multiplication using NE/SE 565 PLL IC
12. Study of Analog to Digital Converter and Digital to Analog Converter

3 – Substantial, 2 – Moderate, 1 – Slight

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Verification on basic gates, combinational circuits and sequential circuits

CO2: Design and Implement of IC741 applications

CO3: Develop an ability to perform operation using IC555, IC 565 and IC566

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1		3	2								2	2	
CO2		3	3								2	2	
CO3		3	3								2	2	
CO4													

1 – Slight, 2 – Moderate, 3 – Substantial

11EE304 ELECTRICAL MACHINES LABORATORY

(Common to Mechatronics, Chemical and EIE branches)

0 0 3 1

LIST OF EXPERIMENTS

1. Open circuit and load characteristics of separately excited and self excited DC generator.
2. Load test on DC shunt motor.
3. Load test on DC series motor.
4. Swinburne‟s test.
5. Speed control of DC shunt motor.
6. Load test on single phase transformer.
7. Open circuit and short circuit test on single phase transformer.
8. Regulation of three phase alternator by EMF and MMF methods.
9. Load test on three phase induction motor.
10. Load test on single phase induction motor.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: To impart practical knowledge about the operation of DC, AC machines and transformers

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1		3						2			1		

1 – Slight, 2 – Moderate, 3 – Substantial

11ME510 THERMODYNAMICS AND FLUID MECHANICS LABORATORY

(Common to EEE and EIE)

0 0 3 1

LIST OF EXPERIMENTS - THERMAL ENGINEERING LABORATORY

1. Valve timing and port timing diagrams for IC Engines.
2. Performance test on a Petrol Engine.
3. Performance test on a Diesel Engine.
4. Heat Balance test on an IC Engine.
5. Performance and Heat Balance Test on Steam Boiler.
6. Performance test on Reciprocating Air Compressors.
7. Performance test on a Refrigerator (Determination of COP).
8. Performance test on an Air Conditioning System (Determination of COP).
9. Determination of viscosity of given oil.

LIST OF EXPERIMENTS - FLUID MECHANICS LABORATORY

1. Test on jet pump.
2. Test on Submersible pump.
3. Test on reaction turbine for obtaining the characteristics curves.
4. Test on impulse turbine to obtain its characteristics curves.
5. Test on positive displacement pump for obtaining its characteristics curves.
6. Test on centrifugal pump for obtaining its characteristics curves.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Apply theoretical concepts developed in the theory course Thermodynamics and fluid mechanics to hands-on experiments.

CO2: Determine and analyse the performance of systems in thermodynamics experiments

CO3: Determine and analyse the performance of systems fluid mechanics experiments

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3	2			1								
CO2	3	2			1								
CO3	3	2			1								

1 – Slight, 2 – Moderate, 3 – Substantial

11EI501 INDUSTRIAL INSTRUMENTATION – II

3 0 0 3

MODULE - I **15**

Mechanical Type Flow Meters:: Variable head type flow meters: Orifice plate – Venturi tube – Flow nozzle – Dall tube. Installation of head flow meters – piping arrangement for different fluids. Pitot tube. Positive displacement flow meters: Constructional details and theory of operation of nutating disc, reciprocating piston, oval gear and helix type flow meters. Inferential meters: Turbine flow meter – Target flow meter – Rotameter: Theory and installation.

Mass Flowmeters: Mass Flow Meters: Angular momentum type – Coriolis type – Thermal type – Volume flow meter plus density measurement.

MODULE - II **15**

Electrical Type Flow Meter: Principle and constructional details of Electromagnetic flow meter – Different types of excitation schemes used. Different types of Ultrasonic flow meters – Laser Doppler Anemometer (LDA) systems. Vortex shedding flow meter –Solid flow rate measurement. Calibration of flow meters: dynamic weighing method. Guidelines for selection of flow meter.

Level Measurement: Level Measurement: Gauge glass technique coupled with photo electric readout system – Float type level indication: Different schemes. Level measurement using displacer and torque tube – Bubbler system. Boiler drum level measurement – Differential pressure method. Electrical Types of Level Gauges: Resistance Tapes, Capacitance Probes, Nuclear radiation and Ultrasonic sensors

MODULE - III **15**

Measurement of Density and Viscosity: Units of density and viscosity used in industries: Baume scale, API scale. Densitometer: Pressure head, Float, Ultrasonic types- Bridge type gas densitometer. Viscosity terms – Saybolt viscometer – Rotameter type.

Humidity And Moisture: Humidity terms – Dry and wet bulb psychrometers – Hot wire electrode type hygrometer – dew cell – electrolysis type hygrometer – Commercial type dew point meter. Moisture terms – different methods of moisture measurement – Moisture measurement in granular materials, Solid penetrable materials like wood and web type.

TOTAL: 45

TEXT BOOKS

1. Krishnaswamy. K, and Vijayachitra.S., "Industrial Instrumentation", New Age International Publishers, New Delhi, 2004.
2. Liptak B.G. "Instrument Engineers Handbook (Measurement)", Butterworth-Heinemann Ltd, Oxford, 1995

REFERENCE BOOKS

1. Patranabis, D., "Principles of Industrial Instrumentation", Tata McGraw-Hill, New Delhi, 1999
2. Jain, R.K., "Mechanical and Industrial Measurements", Khanna Publishers, New Delhi, 1999.
3. http://nptel.ac.in/reviewed_pdfs/112106138/lec34.pdf
4. http://www.engr.sjsu.edu/bjfurman/courses/ME120/me120pdf/FlowMeasurement.pdf
5. https://ay12-14.moodle.wisc.edu/prod/pluginfile.../426-Flow_measurement.pptx
6. http://www.indumart.com/Level-measurement-4.pdf
7. www.omega.com/literature/transactions/transactions_vol_iv.pdf

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: To study the different types industrial instruments for measuring pressure parameter.

CO2: To study the different types industrial instruments for measuring temperature parameter.

CO3: To study the different types industrial instruments for measuring the parameters such as Torque, Velocity, Acceleration, Vibration and Density.

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3		2									3	
CO2	3		2									3	
CO3	3		2									3	

1 – Slight, 2 – Moderate, 3 – Substantial

11EI502 VLSI SYSTEMS

(Common to EEE and EIE branches)

3 0 0 3

MODULE - I **15**

CMOS Technology: - Basic CMOS technology: N well - P well - Twin tub - SOI Process – NMOS - PMOS Enhancement transistor – Transistor operation, MOS DC equations -Threshold voltage - Body effect -channel length modulation - Mobility variation - MOS models - small signal AC characteristics - complementary CMOS inverter DC characteristics - Rise time - fall time - power dissipation - Latch up and prevention. MOSFETS as switches- Pass Transistors.

MODULE - II **15**

CMOS Chip Design:, Transmission gates. Tristates, Logic design with CMOS, Multiplexers using Transmission gates, Flip-flop and latches- Stick diagram for combinational circuits, Layout design rules - Inverter, NAND, NOR. ASIC design flow- CMOS chip design options: Full custom ASICs, Std. Cell based ASICs, Gate Array based ASICs Channelled, Channelless and structured Gate Arrays, Xilinx programmable Gate Arrays- Configurable Logic Block (CLB), Input/Outputs(I/O) -VLSI Design flow.

MODULE - III **15**

VERILOG HDL: Basic Concepts - Lexical conventions-data types-system tasks and compiled directives-modules and ports- - gate level modeling- dataflow modeling- behavioral modeling- switch level modeling –procedural and continuous assignment statements–Structural- gate level description of decoder - equality detector –comparator - priority encoder - D-latch - D-Flip Flop- half adder - Full adder - Ripple Carry adder - memory design – Arithmetic Logic Unit – Multiply and Accumulate.

TOTAL : 45

TEXT BOOKS

1. Neil H.E. Weste, David Harris, Ayan Banerjee," CMOS VLSI Design A circuits and systems Perspective"Third edition, Pearson Education, New Delhi, 2007.
2. Palnitkar Samir., "Verilog HDL: Guide to Digital Design and Synthesis", Third Edition, Pearson Education, New Delhi, 2003.

REFERENCE BOOKS

1. John P.Uyemura, "Introduction to VLSI circuits and systems", John wiley& sons,2003.
2. Smith M.J.S., "Application Specific Integrated Circuits", Pearson Education, New Delhi, 2001.
3. http://nptel.ac.in/courses/117106093/
4. http://nptel.ac.in/courses/117101058/
5. http://nptel.ac.in/courses/117106092/
6. http://studyvlsidesign.blogspot.in/search/label/ASIC%20AND%20FPGA%20DESIGN

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: To learn the basic concepts of modern VLSI circuit design by studying logic design, physical structure and fabrication of semiconductor devices.

CO2: To analyze the electrical and design characteristics of transistors and gates.

CO3: To observe the integration of these devices into complicated high - performance systems

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3		3	2	2			2			3		
CO2	3			2	2							2	
CO3			3	2				1			2		

1 – Slight, 2 – Moderate, 3 – Substantial

11EI503 ANALYTICAL INSTRUMENTATION

3 0 0 3

MODULE - I **15**

Colorimetry, Spectrophotometry and Magnetic Resonance Techniques: Electromagnetic spectrum and its types- Spectral methods of analysis – Beer-Lambert law – Colorimeters – UV-Visible spectrophotometers – Single and double beam instruments – Sources and detectors. IR spectrophotometers – Types. FTIR spectrophotometers - Attenuated total reflectance spectrophotometers – Flame emission photometers – Atomic absorption spectrophotometers – Sources and detectors. Mass spectrometers – Different types – Applications. NMR: Basic principles – NMR spectrometer - Applications.

MODULE - II **15**

Radio Chemical Techniques, Chromatography and pH Meters: Nuclear radiations – Detectors: GM counter – Proportional counter – Solid state detectors – Gamma cameras. X-ray spectroscopy – Detectors. Diffractometers – Absorption meters – Detectors. Chromatography - Different techniques – Gas chromatography – Liquid chromatographs – Types – Detectors – High-pressure liquid chromatographs – Applications. Principle of pH measurement: hydrogen electrodes, glass electrodes, reference electrodes, selective ion electrodes, ammonia electrodes, biosensors.

MODULE -III **15**

Industrial Gas Analyzers, Pollution Monitoring Instruments and Dissolved Component Analyzer: Flue gas Oxygen Analyzer- Dissolved oxygen analyzer. IR analyzers – thermal conductivity analyzers – analysis based on ionization of gases. Air pollution analyzers: carbon monoxide, sulphur dioxide, nitrogen oxides, Hydrocarbons, and H_2S estimation – Sodium analyzer – Silicon analyzer-Dust and smoke measurements.

TOTAL : 45

TEXT BOOKS

1. Khandpur R.S., "Handbook of Analytical Instruments", Tata McGraw-Hill. New Delhi, 2006.
2. Willard H.H., Merritt L.L., Dean J.A., and Settle F.A., "Instrumental Methods of Analysis", CBS Publishing & Distribution, New Delhi, 1995.

REFERENCE BOOKS

1. Liptak B.G, "Instrumentation Engineers Handbook (Process Measurement and Analysis)", CRC Press, Volume I, Fourth Edition, 2003.
2. Ewing. G.W., "Instrumental Methods of Analysis", McGraw-Hill, New York, 2000
3. Skoog, DA and West, D.M., "Principles of Instrumental Analysis", Holt, Saunders Publishing, New York, 2001.
4. Braun. Robert D., "Introduction to Instrumental Analysis", McGraw-Hill, Singapore, 2006.
5. https://www.youtube.com/watch?v=qxPb9vFWdqo
6. https://www.youtube.com/watch?v=iQ3tSjoiQJ8
7. https://www.youtube.com/watch?v=Jc1uC6EbMCs

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Provide knowledge on analytical instruments which utilizes various regions of the Electromagnetic spectrum as source

CO2: Shares knowledge on the Nuclear & Radio chemical techniques, Chromatographic methods and pH measurement.

CO3: Analyse the important methods of industrial gases and pollution monitoring instruments.

CO4: Implement analytical Instruments for various industrial applications

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3	3										3	
CO2	3							2				3	
CO3	3							2				3	
CO4	3							2				3	

1 – Slight, 2 – Moderate, 3 – Substantial

11EE503 CONTROL SYSTEMS

(Common to Mechatronics, ECE, EEE and EIE)

3 1 0 4

MODULE-I **15**

System Representation: Basic elements in control systems – Open and closed loop systems – Modeling of Electrical and mechanical systems – Electrical analogy of mechanical systems – Transfer function – Synchros – AC and DC servomotors – Block diagram reduction techniques – Signal flow graphs – Masons gain formula.

Introduction to state space analysis – canonical form and companion forms.

MODULE – II **15**

Time Response and Stability Analysis: Time response – Time domain specifications – Types of test input – First and Second order system response – Error coefficients – Steady state error- Generalized error series –effect of P, PI, PID controllers on time response.

Characteristics equation – Location of roots in S plane for stability – Routh Hurwitz criterion – Root locus construction – Effect of poles and zeros on system stability.

MODULE – III **15**

Frequency Response and Compensator Design: Frequency response – Bode plot – Polar plot – Constant M an N circles – Nichols chart – Determination of closed loop response from open loop response – Correlation between frequency domain and time domain specifications– stability via gain margin and phase margin - Nyquist stability criterion- Need for compensators - Compensators design - Lag, lead and lag-lead compensator design using bode plot.

Lecture : 45, Tutorial : 15, TOTAL 60

TEXT BOOKS

1. Gopal, M., "Control Systems: Principles and Design", Third Edition, Tata McGraw- Hill, New Delhi, 2008.
2. Ogata K., "Modern Control Engineering", Fourth Edition, Pearson Education/ PHI, New Delhi, 2007.

REFERENCE BOOKS

1. Nagrath I.J. and Gopal M., "Control Systems Engineering", Fifth Edition, New Age International Publishers, New Delhi, 2008.
2. Kuo, B.C., "Automatic Control Systems", Eighth Edition, John Wiley & Sons, New York, 2003.
3. Nise, Norman S., "Control Systems Engineering", Fifth Edition, Wiley Publishers, 2007.
4. http://nptel.ac.in/courses/108101037/15
5. https://ocw.mit.edu/resources/res-6-010-electronic-feedback-systems-spring-2013/course-videos/

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Develop the mathematical model of an Electrical and Mechanical system.

CO2: Analyze the time response, frequency response and stability of the system.

CO3: Design the controller and Compensator to meet the system requirements.

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3			3	2								
CO2	3			2	3								
CO3	3		3	3	2								

3 – Substantial, 2 – Moderate, 1 – Slight

11EE504 MICROPROCESSORS AND MICROCONTROLLERS

(Common to EEE, EIE, CSE and Mechatronics branches)

3 0 0 3

MODULE– I **15**

8085 Micro processor: 8085 Architecture – Functional block diagram - Instruction set – Addressing modes – Timing diagrams – Reset and Power on Reset-Assembly language programming – Interrupts- Memory Interfacing and I/O interfacing - Parallel communication interface – Serial communication interface

MODULE– II **15**

89C51 Microcontroller: Introduction to RISC and CISC Machines -89C51 Micro controller hardware- Memory Bank-Memory mapping-Register organization-I/O pins – Ports and circuits- Counters and Timers-modes of operation-Serial Data communication I/O- Interrupts-Interfacing to external memory-Instruction sets-Addressing modes

MODULE-III **15**

89C51 Programming and Applications :Assembly language programming and Programming with C – Simple programming -I/O port programming -Timer and counter programming – Serial data Communication using max232 converter – Interrupt programming –89C51 Interfacing with Peripherals : LED-Seven segment display – Switch interfacing- LCD, Parallel Analog to Digital Converter- Sensors – Stepper Motors - Speed control of DC motors- Matrix Keyboard and Digital to Analog Converter .

TOTAL : 45

TEXT BOOKS

1. Gaonkar R.S, "Microprocessor Architecture, Programming, and Applications with the 8085", Fifth Edition, Prentice Hall of India, New Delhi, 2002.
2. Mazidi, Mohammed Ali, Mazidi, Janice Gillispie, McKinlay, Rolin.D "The 8051 Microcontroller and Embedded Systems", Pearson Education Asia, second edition, New Delhi, 2007.

REFERENCE BOOKS

1. Hall Douglas V, "Microprocessors and Interfacing Programming and Hardware", Tata McGraw Hill, 1995.
2. Ayala Kenneth J, "The 8051 Microcontroller Architecture Programming and Application", Second Edition, Penram International Publishers (India), New Delhi, 1996.
3. Kleitz. William, "Microprocessor and Microcontroller Fundamental of 8085 and 8051 Hardware and Software", Pearson Education, New Delhi, 1998.
4. http://nptel.ac.in/courses/108107029/
5. http://freevideolectures.com/Course/3018/Microprocessors-and-Microcontrollers
6. https://www.vssut.ac.in/lecture_notes/lecture1423813120.pdf

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Acquire knowledge on the functions in the Architecture of 8085& 8051.
CO2: Identify the different types of addressing modes and instruction set of 8085 & 8051.
CO3: Understand the need and use of Interrupt structure.
CO4: Gain the knowledge about various interfacing ICs and its applications.

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3		2										
CO2			2						2				
CO3	3		3		3				2				
CO4			3		3				3				

1 – Slight, 2 – Moderate, 3 – Substantial

11EE603 POWER ELECTRONICS

(common to ECE, EEE and EIE branches)

3 0 0 3

MODULE - I **15**

Power Semi-Conductor Devices: Construction, Principle of operation – Static and dynamic characteristics of Power diodes, SCR, TRIAC, GTO, power BJT, power MOSFET, IGBT and IGCT – Safe operating Area – protection circuits – series and parallel connections.

Phase Controlled Converters: AC to DC converters: single phase and three phase controlled rectifiers with R, RL and RLE load – Estimation of RMS load voltage, RMS load current and input power factor, DPF - effect of source inductance – Single phase and three phase AC voltage controllers (using thyristors and Triacs). Control circuits: Functional requirements of the switching control circuits.

MODULE - II **15**

DC to DC Choppers: DC to DC converters: DC choppers using devices other than thyristors – Principle of step up and step down operation – single quadrant DC chopper with R, RL and RLE load – Time ratio control –Current Limit Control– two quadrant and four quadrant DC choppers. Voltage, current and load-commutated choppers. Introduction to buck, boost, cuk, buck-boost regulators - Step up and step down cycloconverter – single phase to single phase - three phase to single phase. Generation of timing pulses for DC choppers

MODULE - III **15**

Inverters: DC to AC converters: Inverters– Types – voltage source and current source inverters – single phase bridge inverters – three phase bridge inverters – 180^o and 120^o mode PWM inverters –Series inverter - Control of AC output voltage – Harmonic reduction

Control Circuits and Applications: PWM techniques for DC to AC converters – Introduction to power converter control using Digital controllers. Applications: UPS HVDC systems - SMPS

TOTAL: 45

TEXT BOOKS

1. Rashid, M.H., "Power Electronics: Circuits Devices and Applications", Third Edition, Prentice Hall of India, New Delhi, 2008.
2. Singh, M. D and Kanchandani, "Power Electronics", Second Edition, Tata McGraw-Hill, New Delhi, 2006.

REFERENCE BOOKS

1. Vithayathi, Joseph., "Power Electronics", First Edition, (McGraw-Hill series in Electrical and Computer Engineering), McGraw-Hill, New York, 1995.
2. Dubey, G.K., Doradia, S.R., Joshi, A. and Sinha, R.M., "Thyristorised Power Controllers", Wiley Eastern Limited, New Delhi, 1986.
3. Lander, W., "Power Electronics", Third Edition, McGraw-Hill, New York, 1993.
4. http://nptel.ac.in/courses/108101038/
5. https://www.tutorialspoint.com/power_electronics/index.html

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Understand the construction and operational behaviour of power semiconductor devices

CO2: Analyze and design of power controlled converter circuits

CO3: Analyze the working and performance parameters of voltage controller circuit

CO4: Gain knowledge on the application of power converters in power system and drives using digital controllers

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3												
CO2			3		3								
CO3			3										
CO4	3		3		3								

1 – Slight, 2 – Moderate, 3 – Substantial

11EI504 INDUSTRIAL INSTRUMENTATION LABORATORY

0 0 3 1

LIST OF EXPERIMENTS

1. Calibration of venturi meter
2. Discharge coefficient of orifice tube
3. Calibration of pressure gauge by Dead weight tester
4. Measurement of level using Differential Pressure Transmitter
5. Torque and Angle measurement
6. Viscosity measurement
7. UV – Visible spectrophotometer
8. pH meter standardization and measurement of pH values of solutions
   Conductivity meter calibration and measurements of conductivity of test solutions
9. Measurement of temperature using noncontact type thermometer
10. P/I and I/P converters
11. Flapper Nozzle System
12. Measurement of Respiration rate and Heart rate.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: To measure the physical quantities like flow, level, pressure, viscosity and pH by selecting the suitable sensing element

CO2: To analyze the concentration and absorbance for various samples using suitable analyzer

CO3: To assess the respiration and heart rate using biomedical instruments

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1		3	2									3	
CO2		3	2									3	

1 – Slight, 2 – Moderate, 3 – Substantial

11EI505 SIMULATION AND CONTROL LABORATORY

0 0 3 1

LIST OF EXPERIMENTS

1. Transfer function of DC Motor. A) Armature Control Mode. B) Field Control Mode.
2. Transfer function of AC Servomotor.
3. Time Responses of first order RL and RC circuit
4. Time response of second order systems
5. Stability analysis of the system using MATLAB
6. Compensator design using MATLAB
7. Effect of P,PI and PID controllers on a second order system using MATLAB
8. State space model of a DC motor using MATLAB
9. Effect of Poles and zeros on stability
10. Effect of transportation delay on time response and frequency response of the system
11. Frequency response of LTI systems
12. Study of synchros

REFERENCES:

http://www.nvistech.com/technical-training/instrumentation-control-lab/control-system-lab

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Obtain transfer function model of electrical systems

CO2: Analyze the system for transfer function stability

CO3: Demonstrate the importance of controllers using MATLAB

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1		3											
CO2		3	3		3								
CO3		3											

1 – Slight, 2 – Moderate, 3 – Substantial

11EL202 COMMUNICATION SKILLS LABORATORY

(Common to all Engineering and Technology branches)

0 0 3 1

LIST OF EXPERIMENTS

English Lab

1. Listening Comprehension

   Listening to instructional software packages in the communication laboratory, using them, understanding the mechanics of language like grammar, listening to native speakers‟ presentation, developing oral communication by imitating the model dialogues. Listening for specific information – listening to improve pronunciation – Listening and typing – Filling the blanks – TV programmes and News.

2. Reading comprehension and vocabulary:

   Reading for getting information and understanding; scanning, skimming and identifying topic sentences – reading for gaining knowledge, looking for transitions, understanding the attitude of the writer – Filling the blanks – Cloze exercises – vocabulary building – Comprehension.

3. Speaking:

   Group discussion; verbal and non-verbal communication; speaking on situational topics – maintaining eye contact, speaking audibly, clearly and with confidence – Common errors in English

   Conversations – face-to-Face conversation – Telephone Conversation – Roll play.

4. Writing Skills:

   Writing job application: resume, applications for jobs, making complaint letters – Projects: report writing – editing and proof reading – research paper and translating numerical data from charts and diagrams into verbal communication.

Career Lab

1. Letter Writing / Resume / Report preparation:
   Structuring Letter Writing / Resume / Report preparation / E-Mail
2. Presentation skills
   Elements and structure effective presentation – presentation tools – voice Modulation – Body language – Video samples
3. Group Discussion
   Structure of Group Discussion – Strategies in GD – Team work – Video Samples
4. Interview skills
   Kinds of Interview- corporate culture – video samples
5. Soft Skills
   Time management – stress management – assertiveness – case study

Communication Software Package:

1. **Young India Software**
   a. **Tense Buster Intermediate**
   b. **Issues in English**

Globarena – English Lab / Career Lab Software

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Write, read and listen English effectively
CO2: Communicate efficiently in English in real life and career related situations
CO3: Demonstrate good presentation skill.
CO4: Use the modern communication software package to enhance the soft skills

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1				2					2	3		1	
CO2				2					2	3		1	
CO3				2					2	3		1	
CO4									2	3			

1 – Slight, 2 – Moderate, 3 – Substantial

11GE601 ECONOMICS AND MANAGEMENT FOR ENGINEERS

(Common to all Engineering and Technology branches)

3 0 0 3

MODULE – I **15**

Economics – Basics Concepts and Principles – Demand and Supply – Law of demand – Determinants of demand, Law of supply – market Equilibrium – National Income – Circular Flow of Economic activities and Income –National Income and its measurement techniques – Inflation – Causes of Inflation – Controlling Inflation –Business Cycle .

MODULE – II **15**

Forms of business – Management Functions: Planning, Organizing, Staffing, Leading and Controlling- Managerial Skills - Levels of Management - Roles of manager.

Marketing – Core Concepts of Marketing, Four P"s of Marketing, New product development, Product Life Cycle, Pricing Strategies and Decisions. Operations Management – Resources – Site selection, Plant Layout, Steps in Production Planning and Control – EOQ Determination

MODULE – III **15**

Accounting Principles – Financial Statements and its uses – Time value of Money – Depreciation methods — Break Even Analysis – Capital budgeting techniques – Introduction to FDI, FII, Mergers & Acquisition.

TOTAL : 45

TEXT BOOKS

1. Geetika, Plyali Ghosh, Purba Roy Choudhury, "Managerial Economics", 1st Edition, Tata McGraw-Hill, New Delhi, 2008.
2. Jeff Madura, "Fundamentals of Business", Cengage Learning Inc, India, 2007.

REFERENCE BOOKS

1. Stanley L. Brue and Campbell R Mcconnell, "Essentials of Economics", Tata McGraw-Hill, New Delhi, 2007.
2. S.P.Jain, K.L.Narang, Simi Agrawal, "Accounting for Management", First Edition, Tata McGraw-Hill, New Delhi, 2009

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Estimate market equilibrium and interpret national income calculation and inflation issues.

CO2: Categorize the forms of business and analyse the functions of management.

CO3: Appraise marketing and operations management decisions

CO4: Interpret financial and accounting statements

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	1	1	2			3		2	2	2	3	2	1
CO2		1	2			2	2	2	2	2	3	2	2
CO3	1	2	1			2		2	2	2	3	2	2
CO4	2	2				2		2	2	2	3	2	

1 – Slight, 2 – Moderate, 3 – Substantial

11EI601 PROCESS CONTROL

(Common to Mechatronics and EIE branches)

3 1 0 4

MODULE - I **15**

Process Control Modeling: Definition of industrial process and control- Automatic process control- Need for process control in industry –Process control systems: level, pressure, flow and thermal. Mathematical model of systems –Dynamic behavior of higher order processes – Interacting and non-interacting systems – Continuous and batch processes – Self-regulation – Servo and regulator operations.

MODULE - II **15**

Controller Characteristics ,Tuning and Multiple Loops: Basic control actions – Characteristics of on-off, proportional, single-speed floating, Integral and Derivative control modes – P+I, P+D and P+I+D control modes – Electronic controllers. Evaluation criteria: IAE, ISE, ITAE and ¼ decay ratio. Tuning of controllers: Process reaction curve method – Ziegler Nichols method – Damped oscillation method. Feed forward control – Ratio control – Cascade control – Inferential control – Split range control – Selective control systems - Adaptive control – Introduction to multivariable control.

MODULE - III **15**

Final Control Elements and Unit Operations: I/P converter – Pneumatic and electric actuators – Valve positioner – Control valves – Characteristics of control valves: Inherent and Installed characteristics. Valve body – Commercial valve bodies – Control valve sizing – Cavitation and flashing – Selection criteria. Mixing – Evaporation and control – Drying process – Heat Exchanger - Distillation processes - Case study of binary distillation column – Control schemes..

Lecture: 45, Tutorial: 15, TOTAL: 60

TEXT BOOKS

1. Krishnaswamy K., "Process Control", New Age International Publishers, New Delhi, 2006.
2. Stephanopoulos, G, "Chemical Process Control", Prentice Hall of India, New Delhi, 1990.

REFERENCE BOOKS

1. Eckman, Donald. P., "Automatic Process Control", Wiley Eastern Ltd., New Delhi, 1967
2. Seborg, Dale E., Edgar, Thomas F., and Mellichamp, Duncan A., "Process Dynamics and Control", Wiley Series Edition, New Delhi, 2004.
3. Harriott, P., "Process Control", Tata McGraw-Hill Publishing Co., New Delhi, 1991.
4. http://www.pacontrol.com/download/Process%20Control%20Fundamentals.pdf
5. http://kkft.bme.hu/sites/default/files/Principles%20of%20Process%20Control.pdf
6. http://pc-textbook.mcmaster.ca/Marlin-Ch24.pdf
7. 4.http://www.lesman.com/train/webinars/Webinar-Slides-Control-101.pdf

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Understand the basic knowledge about process control, modelling, different controller characteristics and control valves

CO2: Model different processes and analyzes the characteristics of different controller actions

CO3: Provide the detailed concept behind the controller tuning and advanced control technique

CO4: Apply advanced control techniques to various applications

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3		3		2							3	
CO2			3									3	
CO3			2									3	
CO4	3		2										

1 – Slight, 2 – Moderate, 3 – Substantial

11EI703 COMPUTER CONTROL OF PROCESSES

3 1 0 4

MODULE - I **15**

Sampled Data Systems: Introduction - Review of Sampling Theory - Selection of sampling period – Review of Z-Transform – Linear Transformation – Pulse Transfer Function – Data holds – Modified Z Transformation – Stability of Sampled Data Control System – Bilinear Transformation – Jury‟s Stability Test.

State Space Analysis: Introduction – Discrete time state equation – State equations for sampled data system – Concepts of Controllability and Observability.

MODULE - II **15**

Design of Digital Controllers: Digital equivalent of conventional controller – Position and Velocity form – Control Algorithms – Deadbeat algorithm, Dahlin‟s algorithm, Kalman‟s algorithm – Smith Predictor algorithm – Pole Placement Controller.

MODULE - III **15**

Computer Control Systems: Basic building blocks of computer control system –Data Logging - Supervisory Control - Direct Digital Control – Introduction to AI and expert control systems.

Adaptive Control (Qualitative treatment only)**:** Adaptive Controller – Adaptive schemes: Gain Scheduling adaptive control - Model Reference Adaptive Control (MRAC) – MIT rule – Adaptation of a feed forward gain - Self Tuning Regulator (STR): Deterministic STR - Pole placement design – Predictive STR – Minimum Variance Controller.

Lecture: 45, Tutorial: 15, TOTAL: 60

TEXT BOOKS

1. Deshpande, P.B. and Ash, R.H., “Computer Process Control”, Publication, USA, 1995.
2. Astrom K.J., and Wittenamrk B. “Adaptive Control”, Addison Wesley Publishing Co. USA, 1989

REFERENCE BOOKS

1. Stephanoupoulis, G., “Chemical Process Control”, Prentice Hall of India, New Delhi, 1990.
2. Curtis, D. Johnson., “Process Control Instrumentation Technology”, Seventh Edition, Prentice Hall of India, New Delhi, 2003.
3. Chidambaram, M., “Computer Control of Process”, Narosa Publishers, 2002.
4. http://www.srmuniv.ac.in/sites/default/files/files/IC0403-ccp-1.pdf
5. http://www.mit.edu/~mitter/publications/A1_computer_process_chap.pdf
6. www.rewardinglearning.org.uk/.../3_4_computer_control_and_data_logging.ppt

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Apply the concepts of sample and hold for process identification and model
CO2: Analyse discrete time system for stability
CO3: Understand the importance of various intelligent controllers and its components in real time computer system
CO4: Design various control algorithm for process control applications

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3		3							2			
CO2	1				2					2			
CO3					2					3	3		
CO4					2					3			

1 – Slight, 2 – Moderate, 3 – Substantial

11EI011 INDUSTRIAL DATA COMMUNICATION

3 0 0 3

MODULE- I **15**

OSI reference model, Systems engineering approach, State transition structure, Detailed design,
Media, Physical connections, Protocols, Noise, Cable spacing, Ingress protection.
Copper cable : Cable characteristics -Cable selection -- Coaxial cables -Twisted-pair cable - Distribution/installation standards -Connector standards -Earthing/grounding - Transient protection
Fiber optics - Introduction -Fiber-optic cable -Fiber-optic cable parameters -Types of optical fiber -Basic cable types - Connecting fibers

MODULE- II **15**

RS-232 overview -RS-232 interface standard (CCITT V.24 interface standard) -Half-duplex operation of the RS-232 - Summary of EIA/TIA-232 revisions – Limitations
RS-485 overview - The RS-485 interface standard -RS-485 vs RS-422-Current loop and RS-485 converters -- The 20 mA current - Serial interface converters

MODULE- III **15**

TCP/IP - Internet layer protocols (packet transport) - Host-to-host layer: end to end reliability-Modbus
Modbus protocol structure - Profibus PA/DP/--Profibus protocol stack -The Profibus communication model - Relationship between application process and communication -Communication objects -HART -Introduction to HART and smart instrumentation -HART - Physical layer - Data-link layer - Application layer

TOTAL : 45

TEXT BOOKS

1 Deon Reynders, Steve Mackay, Edwin Wright, “Practical Industrial Data Communications”, Elsevier, 1st Edition, 2005.
2 Lawrence M. Thompson, “Industrial Data Communication”, 2nd Edition, 1997.

REFERENCE BOOKS

1 Douglas E. Corner, “Computer Networks and Internets”, Pearson Education Asia, 5th Indian reprint, 2nd Edition 2001.
2 Behrouz A. Forouzan, “Data Communications and Networking”, Tata McGraw Hill Publishing Co. −New Delhi, 2nd Edition, 2000.
3. http://nptel.ac.in/courses/106105082/
4. https://www.youtube.com/watch?v=sG6WGvzmVaw
5. http://www.kelm.ftn.uns.ac.rs/literatura/pdms/PracticalIndustrialDataCommunications.pdf

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: understand the concepts, terminologies and technologies used in modern data communication
CO2: in industrial networking gain knowledge about the cable standards and its characteristics
CO3: identify the suitable protocol for industrial data communication

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	2			3							2		
CO2	2			3							3	3	
CO3				3							3	3	

1 – Slight, 2 – Moderate, 3 – Substantial

11EE604 DIGITAL SIGNAL PROCESSING AND APPLICATIONS

(Common to EEE and EIE branches)

3 1 0 4

MODLUE - I **15**

Introduction and Discrete Time System Analysis:

Need and advantages of Digital Signal Processing; Classification of systems: Continuous, discrete, linear, causal, stable, dynamic, recursive, time variance; classification of signals: continuous and discrete, periodic and symmetric energy and power; signal representation by singularity functions; Unit impulse, step ramp and exponential; Transformation of signals: Shifting scaling, folding in amplitude and time. Sampling, quantization, quantization error, Nyquist rate, aliasing effect.

Z-transform and its properties, inverse z-transforms; difference equation – Solution by z-transform, application to discrete systems – Stability analysis. convolution – Methods of evaluation convolution using Z transform.

MODLUE - II **15**

Frequency Response and FIR Filter Design

Discrete time Fourier transform, DFT - Efficient computation of DFT- Properties of DFT – FFT algorithms – Radix-2 FFT algorithms – Decimation in Time – Decimation in Frequency algorithms –Use of FFT algorithms in Linear Filtering and correlation. Computation of IDFT using DFT. Introduction to Wavelet transform:

FIR Filter Design: Amplitude and phase responses of FIR filters – Linear phase filters – symmetrical linear phase filter asymmetrical linear phase filter - windowing techniques for design of Linear phase FIR filters – Rectangular, Hamming, Hanning – Realization of FIR filters – Transversal, Linear phase and Polyphase realization structures.

MODLUE- III **15**

IIR Filter Design and DSP Processor:

IIR Filter Design: Review of design of analogue Butterworth and Chebychev Filters, Frequency transformation in analog domain – Design of IIR digital filters using impulse invariance technique – Design of IIR digital filters using bilinear transformation – pre warping – Frequency transformation in digital domain. IIR Filter structure realization – Direct, cascade, and parallel forms.

DSP Processor and Finite Word Length Effect: Architecture and features of TMS 320C54 signal processing chip. Representation of numbers in digital system: fixed point and floating point – Quantisation by truncation and rounding – Quantisation of input data, filter coefficient – Product quantization error – limit cycles in recursive systems: Zero input limit cycle, overflow limit cycle, scaling to prevent overflow. DSP applications: Harmonic analysis, motor control.

Lecture : 45, Tutorial : 15, TOTAL 60

TEXT BOOKS

1. Proakis John G, and Manolakis Dimtris G., "Digital Signal Processing: Principles, Algorithms and Application", Fourth Edition, Prentice Hall of India, New Delhi, 2007.
2. Venkataramani. B and Bhaskar M., "Digital Signal Processor Architecture, Programming and Application", Tata McGraw-Hill, New Delhi, 2002.

REFERENCE BOOKS

1. Oppenheim, Alan V. and Schafer, Ronald., "Digital Signal Processing", Prentice Hall of India Pvt. Ltd., New Delhi, 2008.
2. Mitra S.K., "Digital Signal Processing: A Computer Based Approach", Tata McGraw-Hill, New Delhi, 1998.
3. Avtar singh and Srinivasan S, "DSP Implementation using DSP Microprocessor with Examples from TMS32C54XX", Thomson / Brooks cole Publishers, Singapore, 2003.
4. Poornachandra S, and Sasikala B, "Digital Signal Processing", Second Edition, Tata McGraw-Hill, New Delhi, 2008.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: to obtain knowledge on frequency domain analysis of discrete time signals

CO2: to design digital filters using DSP Processors

CO3: to understand the effects of word length in the design of digital filters

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3	3			2						3		
CO2	2	3	3		2						3		
CO3	2	3	2								2		

1 – Slight, 2 – Moderate, 3 – Substantial

11EI605 EMBEDDED CONTROL

(Common to EIE, EEE, CSE and Mechatronics branches)

3 0 0 3

MODULE– I **15**

Introduction to 8 - Bit Microcontrollers: Architecture of PIC 18- Pin Description – Memory organization: Program memory – Data Memory: Register Organization – Oscillator and Reset circuits – Addressing Modes – Instruction set – Simple Programs.

MODULE– II **15**

PIC Programming and Applications: Timers – Counters – Capture/ Compare mode – PWM – External Hardware Interrupts – I/O Ports – USART – I^2C – ADC – Interfacing to External memory – Assembly language programming: I/O ports – Timers – Counters – PWM – External Hardware Interrupts.

MODULE-III **15**

Real-Time Operating System Concepts and Case Studies: Architecture of the Kernel - task and task scheduler - Interrupt Service Routines – Semaphores –Mutex – Mailboxes - Message Queues - Event Registers – Pipes – Signals – Timers - Memory Management – Priority Inversion Problem - Scheduling approaches - Optimality of the Earliest deadline first (EDF) algorithm - challenges in validating timing constraints in priority driven systems - Use of µC/OS-II - Case study of coding for an Automatic Chocolate Vending Machine using MUCOS RTOS

TOTAL : 45

TEXT BOOKS

1. Mazidi, Muhammad Ali, Mckinlay, Rolin D., and Causey Danny, "PIC Microcontroller and Embedded Systems using Assembly and C for PIC 18", Pearson Education Asia, 2008.
2. Rajkamal, "Embedded Systems Architecture, Programming and Design", Tata McGraw Hill, New Delhi, 2003

REFERENCE BOOKS

1. Peatman, John B., "Design with PIC Microcontrollers", Pearson Education, New Delhi, 2002.
2. Microchip/PIC Microcontroller Data manuals.
3. Valvano Jonathan W., "Embedded Microcomputer Systems- Real Time Interfacing", Second Edition, Thomson Asia, Singapore, 2001.
4. Labrosse, Jean J., "Micro C/ OS –II : The real –time curnal", Second Edition, CMP Books group west publications, 2002.
5. nptel.ac.in/courses/108102045

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Understand the basic concepts of 8-bit Microcontroller.

CO2: Develop the programming concepts for embedded applications

CO3: Knowledge about real time operating system

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3				3								
CO2			3		3				2				
CO3	3		3						2		3		

1 – Slight, 2 – Moderate, 3 – Substantial

11EI604 PROCESS CONTROL LABORATORY

0 0 3 1

LIST OF EXPERIMENTS

1. Response of Interacting systems
2. Response of non-interacting systems
3. Closed loop response of flow control system
4. Closed loop response of level control system.
5. ON-OFF control of Level and Flow processes
6. Tuning of PID controller.
7. Closed loop response of temperature control system
8. Closed loop response of pressure control system.
9. Installed and Inherent characteristics of a control valve.
10. Response of feed-forward control system
11. Response of cascade control system
12. Response of ratio control system

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Obtain the response of various process control system

CO2: Determine the tuning parameters of process systems and verify the performance characteristics of control valves.

CO3: Determine the response of the advanced control systems to various processes.

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3	3											
CO2		3	1		2						3	3	
CO3		3	1		2						3	3	

1 – Slight, 2 – Moderate, 3 – Substantial

11EE606 DIGITAL SIGNAL PROCESSING AND APPLICATIONS LABORATORY

(Common to EEE and EIE branches)

0 0 3 1

LIST OF EXPERIMENTS

1. Generation and analysis of Continuous and Discrete time Signals.
2. Verification of Sampling Theorem.
3. Linear and Circular Convolution.
4. Determination of LTI system responses.
5. Analysis of signals using various frequency transforms.
6. Design and analysis of FIR filters (All types).
7. Design and analysis of IIR filters (All types).
8. Realization of FIR and IIR filter Structures.
9. Study of TMS 320C54X DSP Processor.
10. Harmonic analysis of signals using DSP Processor.

Software Reference:

- MATLAB 7.1
- TMS320C54X Simulator

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: to obtain the programming knowledge on DSP using MATLAB software.
CO2: to design and implement the filtering operations using TMS320C54X.
CO3: to understand the harmonic analysis in the design of digital filters using TMS320C54X.

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3		3		3								
CO2	3		3		3								
CO3	2		3		3								

1 – Slight, 2 – Moderate, 3 – Substantial

11EE506 MICROPROCESSORS AND MICROCONTROLLERS LABORATORY

(Common to Mechatronics, EEE, EIE and CSE branches)

0 0 3 1

LIST OF EXPERIMENTS

MICROPROCESSOR PROGRAMMING:

1. Study of 8085 Microprocessor Kits.
2. Arithmetic operations using 8085
3. Sorting of number series.
4. Code conversion
5. Arithmetic and geometrical series.
6. A/D and D/A conversions.

MICROCONTROLLER PROGRAMMING:

7. Study of 8051/8031 Microcontroller Kits.
8. Arithmetic functions using microcontroller 8051.
9. Logical operations.
10. Stepper motor control.
11. Interfacing of high power devices.
12. Hex code conversion using Keil compiler and burning into the microcontroller

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Demonstrate the programming skills in 8085 and 8051

CO2: Interface Processor and Controller with Peripheral Devices in real time

CO3: Compile and burn the coding in Keil Environment

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
CO1	3		3									
CO2	3		3		3	2	2					
CO3	3		3		2	2						2

3 – Substantial, 2 – Moderate, 1 – Slight

11GE701 TOTAL QUALITY MANAGEMENT

(Common to all Engineering and Technology branches)

3 0 0 3

MODULE – I **15**

Quality Systems: Definition of Quality, Dimensions of Quality, Quality Planning, Quality costs, Basic concepts of Total Quality Management, Historical Review. Need for ISO 9000 and Other Quality Systems, ISO 9000:2008 Quality System – Elements, Implementation of Quality System, Documentation, Quality Auditing, Introduction to TS 16949, QS 9000, ISO 14000, ISO 18000, ISO 20000, ISO 22000.

MODULE – II **15**

TQM Principles: Principles of TQM, Leadership – Concepts, Quality Council, Quality Statements, Strategic Planning, Deming Philosophy, Barriers to TQM Implementation. Customer satisfaction – Customer Perception of Quality, Customer Complaints, Customer Retention, Employee Involvement – Motivation, Empowerment, Teams, Recognition and Reward, Performance Appraisal, Benefits. Continuous Process Improvement – Juran Trilogy, PDSA Cycle, 5S, Kaizen, Supplier Partnership – Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures – Basic Concepts.

MODULE – III **15**

TQM Tools: The seven tools of quality, Statistical Fundamentals – Measures of central Tendency and Dispersion, Population and Sample, Normal Curve, Control Charts for variables and attributes, Process capability, Concept of six sigma, New seven Management tools, Poka Yoke. Benchmarking – Reasons to Benchmark, Benchmarking Process, Quality Function Deployment (QFD) – House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM) – Concept, Improvement Needs, FMEA – Stages of FMEA.

TOTAL :45

TEXT BOOKS

1. Besterfield, Dale H. et al., "Total Quality Management", Third Edition, Pearson Education, 2008
2. Subburaj Ramasamy, "Total Quality Management", Tata McGraw Hill, New Delhi, 2007.

REFERENCE BOOKS

1. Feigenbaum. A.V, "Total Quality Management", Tata McGraw Hill, New Delhi, 1999.
2. Suganthi, L and Samuel A Anand., "Total Quality Management", PHI Learning, New Delhi.
3. Evans James R. and Lindsay William M., "The Management and Control of Quality", Seventh Edition, South-Western (Thomson Learning), 2007.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Illustrate the evolution and basic concepts of TQM
CO2: Interpret various ISO standards and their implementation procedures
CO3: Apply the principles of TQM and its elements in real time scenario
CO4: Adapt quality tools and techniques to implement TQM at the work place

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1						2	2	3	2	2	2	2	
CO2						3	3	3	3	2	2	2	
CO3					2	3	2	3	3	3	2	2	
CO4	3	2	2	2	2	1		2	2	2	3	3	

1 – Slight, 2 – Moderate, 3 – Substantial

11EI701 PLC, SCADA AND DCS

(Common to EEE and EIE branches)

3 0 0 3

MODULE- I **15**

PLC Programming: PLC: Evolution – Components of PLC – Advantages over relay logic - PLC programming languages – Ladder diagram – Programming timers and counters –PLC Specifications –Timer Functions: Types, programming - Counter Functions: Types, programming. Advanced functions – Arithmetic functions – Logic functions – Comparison functions - Program control instructions, math instructions, and sequencer instructions. Advanced Instructions in PLC – Program control instructions, math instructions, sequencer instructions.

MODULE - II **15**

DCS: DCS: Evolution – Different architectures – local control unit – Operator interface – Displays – Engineering interface.

HART: HART: Introduction – Evolution of signal standards – HART communication protocol – communication modes – HART networks – Control system interface – HART commands – HART field controller implementation – HART and ISO-OSI model.

Field Bus: Field bus: Introduction –Architecture – Basic requirements of field bus standard – Field bus topology – interoperability – interchangeability.

MODULE- III **15**

Applications of PLC: Bottle filling system – Material handling system – Spray Painting System – Pneumatic Stamping System.

Applications of DCS: Applications of DCS in Power plants, Iron and Steel plants, Chemical plants, Cement plants and Pulp and Paper plants.

SCADA: Supervisory Control and Data Acquisition (SCADA) – overview – Developer and runtime packages – architecture – Tools – Tag – Internal & External graphics, Alarm logging – Tag logging – structured tags – Trends – history – Report generation

TOTAL: 45

TEXT BOOKS

1 Webb John W. and Reis Ronald A., "Programmable Logic Controllers", Prentice Hall Publications, New Delhi, 2005.
2. Lukas, Michael P., "Distributed Control Systems", Van Nostrand Reinfold Company, 2002.

REFERENCE BOOKS

1. Petrezeulla, "Programmable Controllers", McGraw Hill, New York, 1989.
2. Popovic D. and Bhatkar V.P., "Distributed Computer Control for Industrial Automation, Marcel Dekkar Inc., New York, 1990.
3. Cimplicity Scada Packages Manual Fanuc India Ltd, 2004.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Understand the basic concepts of PLC and DCS

CO2: Develop ladder logic for various applications and understand HART, SCADA Field bus concepts

CO3: Apply PLC and DCS knowledge in Industrial Applications

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3									3	3		
CO2					3			2		3	3	3	
CO3					2			2		3	3	3	

1 – Slight, 2 – Moderate, 3 – Substantial

11EI702 POWER PLANT INSTRUMENTATION

3 0 0 3

MODULE - I **15**

Over View of Power Generation & Instrumentation and Controls in Water Circuit: Brief survey of methods of power Generation – Hydro, thermal, nuclear, solar, wind and other nonconventional – Thermal power units – Block diagram showing major equipment – functions of Major equipment – Importance of Instrumentation in power generation – P&I diagram – control rooms – Thermal and Electrical.

Raw water – Feed water Boiler – water – Steam – Condensed water – Circulation systems – Drum Level measurement and control – Single, double and three element controls – Steam and water flow measurement – Temp and pressure corrections – Super heater temperature controls – steam pressure and temperature measurements –pH and conductivity measurement – Analysis of impurities in steam and water – Dissolved oxygen analyser.

MODULE - II **15**

Instrumentation and Control in Air-Fuel Circuit :Measurement of solid, liquid and gaseous fuels – pressure, temperature and flow rate – composition control – Air/Fuel ratio control – atomization control – furnance draft control – primary air and secondary air controls – Flue gas analyser – Chromatography – pollution monitoring

MODULE - III **15**

Power Plant Management & Turbine – Monitoring and Control: Calculation of efficiency of boilers – Input / Output method-heat loss method – Master control and distribution of loads to different boilers –Distributed control systems and interlocks applicable to thermal power plant – Supervisory control and Data Acquisition (SCADA) – maintenance and calibration of Instruments.

Inlet steam pressure and flow – Measurement and control – Speed, Vibration, shell temperature monitoring and control – Bearing temperature and alarms – Lubricant oil temperature – Alternator cooling system – condensate flow and level – Vacuum measurement.

TOTAL: 45

TEXT BOOKS

1. Krishnaswamy, K.and Ponnibala.M, "Power Plant Instrumentation" Prentice Hall Pvt Ltd, 2010.
2. Dukelow, Sam G.., "The Control of Boilers", Instrument Society of America, 1991

REFERENCE BOOKS

1. Liptak, B.G., "Instrumentation in process Industries", Butterworth and Heinmann, Oxford, 1995
2. Elonka, S.M. and Kohal, A.L., „Standard Boiler Operations" Tate Mc Graw Hill, New Delhi 1994
3. Morse, Frederic T., "Power Plant Engineering", East west press, New Delhi
4. https://www.vssut.ac.in/lecture_notes/lecture1423005996.pdf

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Attain the knowledge on different methods and various equipments used for power generation.

CO2: Design the control circuit for a boiler with the application of instruments and measurements

CO3: Implement the power plant management system by adopting advanced process control systems.

Mapping of COs with POs

COs/POs	a	b	c	d	E	f	g	h	i	j	k	l	m
CO1	1							3					
CO2			3		1								
CO3			3		3			2			3	3	

1 – Slight, 2 – Moderate, 3 – Substantial

11EI018 NEURAL NETWORKS AND FUZZY SYSTEMS

(Common to EEE and EIE branches)

3 0 0 3

MODULE - I **15**

Neural Networks: Introduction – Biological neuron – Artificial neuron – Neuron modeling – Learning rules – Single layer – Multi layer feed forward network – Back propagation – Learning factors. Recurrent Network-Back propagation through Time Algorithm-RBF network.

MODULE - II **15**

Fuzzy Logic Systems: Classical sets – Fuzzy sets – simple operations on fuzzy sets-Fuzzy relations – Fuzzification – Defuzzification – Fuzzy rules. Membership function – Knowledge base.Introduction to Neuro Fuzzy system:Fuzzy neural hybrid,Neuro fuzzy hybrid.

MODULE - III **15**

Application Of Neural Networks: Applications of artificial neural network-XOR Problem-process identification-classification-inverted pendulum

Application Of Fuzzy Logic Systems: Fuzzy logic control – Inverted pendulum – Image processing – Home heating system – Blood pressure during anesthesia – reactor flow control..

TOTAL: 45

TEXT BOOKS

1. S.N.Sivanandam, S. Sumathi,S.N.Deepa, "Introduction to Neural Networks using MATLAB 6.0", Tata Mc GrawHill,2006
2. Timothy J. Ross, „Fuzzy Logic with Engineering Applications", Tata McGraw Hill, 1997

REFERENCE BOOKS

1. Jacek M. Zurada, „Introduction to Artificial Neural Systems", Jaico Publishing home, 2002.
2. Laurance Fausett, Englewood cliffs, N.J., „Fundamentals of Neural Networks", Pearson Education, 1992
3. John Yen & Reza Langari, „Fuzzy Logic – Intelligence Control & Information", Pearson Education, New Delhi, 2003.
4. http://nptel.ac.in/courses/117105084/
5. http://www.nptelvideos.in/2012/12/neural-networks-and-applications.html

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Gain the exposure about concepts of learning rules and methods of neural and fuzzy systems

CO2: Develop various algorithm techniques for neural computing.

CO3: Solve the problems for neuro and fuzzy techniques.

CO4: Acquire knowledge on various applications of neuro fuzzy control to real time systems.

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1			3		2			2					
CO2	3		3		2			2					
CO3	3				3			2					
CO4								3			3		

1 – Slight, 2 – Moderate, 3 – Substantial

11EI704 PLC, SCADA AND DCS LABORATORY

0 0 3 1

LIST OF EXPERIMENTS

1. Study of Programmable logic controller
2. Implementation of various types of Timer functions using PLC
3. Implementation of various types of Counters functions using PLC
4. Control of bottle filling system using PLC
5. Material Handling System using PLC
6. Pneumatic Stamping System using PLC
7. Development of HMI using SCADA
8. Monitoring and control of level process using DCS
9. Monitoring and control of pressure process using DCS
10. Monitoring and control of flow process using DCS
11. Monitoring and control of cascade control process using DCS
12. Development of graphic generation using DCS

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Understand the Programming Concepts of PLC and SCADA
CO2: Develop ladder logic for various control applications
CO3: Apply DCS programming for various processes.

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	2	3								3	3		
CO2					2					3	3	3	
CO3		3						1		3	3	3	

1 – Slight, 2 – Moderate, 3 – Substantial

11EI705 INSTRUMENTATION SYSTEM DESIGN LABORATORY

0 0 3 1

1. Design and instrumentation amplifier based on the three operational amplifier configurations with a differential gain of 100.
2. Design an active first order and second order Butterworth type Low – Pass and High Pass filter with the following specifications.
   Low pass filter: Cut – off frequency : 1 KHz
   High pass filter: Cut – off frequency : 1 KHz
3. Design a voltage to current converter (grounded load) with the following specification
   Input voltage range : (0 – 5) V
   Output range : (4-20) mA (should be independent of load)
4. Design a current to voltage converter with the following specification
   Input current range : (4-20) mA
   Output voltage range : (0-5) V
5. Design a signal conditioning circuit for RTD. The specification is as follows
   Temperature Range : 30^0 C – 100^0C
   Output voltage : 0 – 5 V DC
   Sensor : RTD (Pt 100)
   Current through RTD: Not to exceed 10mA
6. Design and Implementation of cold junction compensation circuit for thermocouple
7. Design of Electronic PID controller.
8. Design and implementation of regulated ±12V dual power supply circuit.
9. Design and implementation of signal conditioning circuit for load cell.
10. Study of control valve (sizing and flow – lift characteristic)
11. Study of Piping and instrumentation diagram and Preparation of documentation of instrumentation project (process flow sheet, instrument index sheet and instrument specifications sheet).

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Design of signal conditioning circuit for various measurement systems.
CO2: Implement various controllers and conversion modules.
CO3: Apply P & I diagram for various process industries.

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1		3	3										
CO2		3		2						1			
CO3		3									3	3	

1 – Slight, 2 – Moderate, 3 – Substantial

11EI706 VIRTUAL INSTRUMENTATION LABORATORY

0 0 3 1

LIST OF EXPERIMENTS /EXERCISES

1. Introduction to LabVIEW-Front panel, Block diagram, control palette, function palette and toll palette.
2. Simple program using different data types: numeric, Boolean and strings.
3. Programming with Loops & local and global variable.
4. Programming with structures.
5. Programming Arrays and clusters.
6. Storing and retrieving data using file I/O operations.
7. Signal analysis using waveform, graph and chart.
8. Programming with SUB VI , formula and formula node.
9. Study of simulation module.
10. Real time process parameter measurement using DAQ card.
11. Study of control system tool box.
12. Study of Web Publishing tool.

REFERENCES:

1. http://srmuniv.ac.in/sites/default/files/files/WEB-PPT3-EIE-dept(1).pdf
2. https://www.slideshare.net/PrincyRandhawa/virtual-instrumentation-labview

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Develop programming using LabVIEW
CO2: Understand the concept of Data Acquisition system in real time.
CO3: Build the applications using LabVIEW.

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3	1	1		2			2					1
CO2	3		2		2			2			3		1
CO3	3		1						2	1	2		2

1 – Slight, 2 – Moderate, 3 – Substantial

11GE801 PROFESSIONAL ETHICS AND HUMAN VALUES

3 0 0 3

MODULE – I **15**

Introduction to Human Values and Engineering Ethics: Understanding: Morals- Values-Ethics– Honesty – Integrity – Work Ethic – Service Learning – Civic Virtue –caring – Sharing– Courage – Valuing Time – Co-operation – Commitment – Empathy –Self-Confidence – Character – Spirituality- Senses of 'Engineering Ethics' - variety of moral issues - types of inquiry - moral dilemmas - moral autonomy - Kohlberg's theory - Gilligan's theory - consensus and controversy – Models of Professional Roles - theories about right action - Self-interest –customs and religion- uses of ethical theories.

MODULE - II **15**

Safety, Responsibilities and Rights: Meaning of Engineering experimentation - engineers as responsible experimenters - codes of ethics for engineers - a balanced outlook on law - the challenger case study. 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 – discrimination- Intellectual Property Rights (IPR)

MODULE - III **15**

Global Ethical Issues and Codes : Multinational corporations - Environmental ethics - computer ethics – weapons development-engineers as managers-consulting engineers-engineers as expert witnesses and advisors -moral leadership-sample code of Ethics like ASME, ASCE, IEEE, Institution of Engineers (India), Indian Institute of Materials Management, Institution of Electronics and Telecommunication Engineers(IETE),India. etc.

TOTAL: 45

TEXT BOOKS

1. Martin Mike and Schinzinger Roland, “Ethics in Engineering”, Tata McGraw-Hill, New Delhi, 2003.
2. Govindarajan M, Natarajan S, and Senthil Kumar V. S, “Engineering Ethics”, Prentice HallofIndia, NewDelhi, 2004.

REFERENCE BOOKS

1. Fleddermann, Charles D., ”Engineering Ethics”, Pearson Education/Prentice Hall, New Jersey, 2004.
2. Harris, Charles E, Michael S. Protchard and Michael J Rabins, “Engineering Ethics –Concepts and Cases”, Wadsworth Thompson Learning, United States, 2000.
3. Edmund G Seebauer and Robert L Barry, “Fundamentals of Ethics for Scientists and Engineers”, Oxford University Press, Oxford, 2001.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Examine the various aspects of human values.
CO2: Develop as responsible experimenters particularly with reference to safety.
CO3: Apply appropriate code of ethics to evaluate the probable consequences of actions.

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1						3		3		2		3	
CO2	1	2	2	2		2	2	3	3	2		3	
CO3				1		2	1	3	3			3	

1 – Slight, 2 – Moderate, 3 – Substantial

11EI802 PROJECT WORK

0 0 18 9

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Enable the students, to work in a group involving some design and analysis work or theoretical and experimental studies related to the Electronics and Instrumentation engineering discipline.

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1			3	3			1			2	3	3	3

1 – Slight, 2 – Moderate, 3 – Substantial

11EI801 INSTRUMENTATION AND CONTROL IN PETROCHEMICAL INDUSTRIES

3 0 0 3

MODULE- I **15**

Petroleum Processing and Operations: Petroleum Exploration – Drilling - Recovery techniques - well completion methods – crude oil chemistry and composition – Refining of crude oil – Feed stocks – separation of gases into individual constituents – Thermal cracking – catalytic reforming – catalytic cracking – polymerization – alkylation – Isomerisation.

MODULE - II **15**

Instrumentation and Controls in Reactors, Evaporators and Heat Exchangers: Reactor fundamentals – Temperature control – once through – cascade – split range controls – Reactor pressure and vacuum control –Batch and continuous reactors control – Types of evaporators – Control systems for evaporators – Feedback, cascade and feed forward controls – Liquid – to- liquid heat exchangers – Three –way valves control – steam heaters controls – condenser controls- Reboiler controls – vapourisers control

MODULE- III **15**

Instrumentation and Controls in Dryers, Distillation Columns, Pumps and Water Treatment Plant: Controls of batch and continuous dryers. Distillation equipment – variables – Basic controls – Product Quality control – Composition control – Inferring composition from temperature – controls using chromotograph and Analysers – Pressure control –Feed flow and Temperature control. Different pumps – Centrifugal pumps – rotary pumps – reciprocating pumps – Throttling control – ON- OFF control – Water treatment controls – chemical oxidation- chemical reduction – neutralisation – precipitation – biological controls

TOTAL: 45

TEXT BOOKS

1. Liptak, B.G., "Instrumentation in Process Industries", Butterworth and Heinmann Ltd, Oxford, 1995
2. Krishnaswamy, K., "Process Control", New Age International Publishers, New Delhi, 2006.

REFERENCE BOOKS

1. Dr. Ram Prasad., "Petroleum Refining Technology", Khanna publishers, New Delhi, 2007
2. Austin G.T. Shreeves., "Chemical Process Industries", McGraw-Hill International Student Edition, Singapore, 1985.
3. Considine, D.M., "Handbook of Applied Instrumentation", McGraw-Hill, 1964.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: To provide the basics of petroleum exploration, refining and basic operations in petroleum industry.

CO2: To provide adequate knowledge about chemical reactors, evaporators and heat exchangers including instrumentation and controls.

CO3: To impart knowledge pertaining to dryers, distillation columns, pumps and water treatment plant including instrumentation and controls.

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3											3	
CO2			3		1			3			3		
CO3			3		1			3				1	

1 – Slight, 2 – Moderate, 3 – Substantial

11CS304 SOFTWARE ENGINEERING

(Common to EIE, CSE and IT branches)

3 0 0 3

MODULE - I **15**

Process Models and Requirement Analysis: A Generic view of processes – Process models: Waterfall models, Incremental models, Evolutionary models, Specialized models – Agile process and models – System engineering, Requirement engineering: tasks, Initiating the process, Eliciting requirements, Developing use cases – Negotiating requirements – Validating requirements – Building the analysis models: Concepts – Object oriented analysis – Scenario based modeling – Data & Control flow oriented model – Class based model – Behavioral model.

MODULE - II **15**

Software Design: Design concepts – Design models – Pattern based design – Pattern analysis and design – Pattern catalogs – Architectural design –Architectural styles – Component level design – Class based and conventional components design – Real-time system design – User interface design – Human computer interface design- Object-oriented design: Objects and object classes, An object oriented design process, Design evolution.

MODULE - III **15**

Software Testing and Software Project Management: Software testing – Strategies – Issues – Test strategies for conventional and object oriented software – Validation and system testing – Debugging - Testing tactics: White box testing, Basis path testing – Control structure testing – Black box testing - Object oriented testing – Testing GUI – Testing client/server – Test documentation – Estimation - Project scheduling - Risk management - Change management.

TOTAL 45

TEXT BOOKS

1. Pressman, Roger S., "Software Engineering: A Practitioner‟s Approach", Sixth Edition, McGraw-Hill, New York, 2008.
2. Sommerville, I, "Software Engineering", Eighth Edition, Addison Wesley, New York, 2008.

REFERENCE BOOKS

1. Jalote, Pankaj, "An Integrated Approach to Software Engineering", Third edition, Narosa Publishing House, New Delhi, 2008.
2. Ghezzi, Et al, "Fundamental of Software Engineering", Second Edition, Prentice Hall of India, New Delhi, 2009.
3. SWEBOK, "Guide to the Software Engineering Body of Knowledge", A project of the IEEE Computer Society Professional Practices Committee, 2004.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Describe key aspects of process models and identify a suitable model for a software system

CO2: Identify the tasks in requirement engineering and describe several analysis models

CO3: Summarize different methods for the design of a software system

CO4: Illustrate testing methods and project management aspects of software development

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1			3	2	3				1		1	2	
CO2			3	2	3				1		1	2	
CO3			3	2	2			3	2		2	2	
CO4			3	1	2				1		2	2	

3 – Substantial, 2 – Moderate, 1 – Slight

11CS401 DATABASE MANAGEMENT SYSTEMS

(Common to Mechatronics, EIE,CSE and IT branches)

3 0 0 3

MODULE – I **15**

Data Models and Normalization: Introduction – Database System Applications – Purpose of database systems – View of data – Database Languages – Relational Databases – Database Design – Data Storage and Querying – Transaction Management – Database Architecture – Database Users and Administrators- Relational Model – Structure of Relational Databases – Database Schema – Keys – Schema Diagrams – Relational Query Languages - Relational Operations - SQL introduction – Intermediate SQL – Database Design and E-R model – Relational Database Design.

MODULE - II **15**

Indexing and Transaction Processing: RAID – File Organization – Organization of Records in Files – Ordered indices – B^+ Tree index files – Static and Dynamic Hashing – Bitmap indices – Index in SQL - Query Processing - Overview – Measures of Query Cost - Sorting – Selection, Join and Other Operations - Transactions - Concurrency control- Lock-based Protocols - Deadlock Handling – Multiple Granularity – Timestamp and Validation Based Protocols -Recovery System- Failure classification – Storage – Recovery and atomicity – Algorithm – Buffer management – Failure with loss of nonvolatile storage – Early lock release and Logical undo operations-ARIES

MODULE - III **15**

Distributed and Parallel Database: Centralized and Client-Server Architectures – Server System Architectures – Parallel Systems – Distributed Systems -Parallel Databases – I/O Parallelism – Interquery and Intraquery Parallelism – Interoperation and Intraoperation Parallelism- Distributed Databases- Homogeneous and Heterogeneous Databases – Distributed Data Storage and Transactions – Commit Protocols – Concurrency Control – Availability – Query Processing

TOTAL : 45

TEXT BOOKS

1. Silberschatz. Abraham, Korth, Henry F. and Sudarshan S., "Database System Concepts", Sixth Edition, McGraw-Hill, New York, 2011.

REFERENCE BOOKS

1. Elmasri, Ramez and Navathe, Shamkant B., "Fundamental Database Systems", Fifth Edition, Pearson Education, New Delhi, 2007
2. Kifer Michael, Philip Lewis, Arthur Bernstein and Prabin Panigrahi "Database Systems: An Application-Oriented Approach, Introductory Version", Second Edition, Pearson Education, New Delhi, 2007.
3. Date C J, Kannan A and Swamynathan S, "An Introduction to Database Systems", Eighth Edition, Pearson Education, New Delhi, 2006.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Design a relational database using ER model and normalization
CO2: Apply SQL to create and manipulate a relational database
CO3: Demonstrate the use of indexing techniques, query processing and recovery system
CO4: Explain the concepts of distributed databases, concurrency control and parallel databases

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3	3	3									2	
CO2	3	3	3									2	
CO3	3	3	3									2	
CO4	1	1	2									1	

3 – Substantial, 2 – Moderate, 1 – Slight

11CS402 OPERATING SYSTEMS

(Common to ECE, EIE, CSE and IT branches)

3 0 0 3

MODULE - I **15**

Operating System Concepts and CPU Scheduling: Introduction – Computer System Organization –Operating System Structure-Process Management – Memory Management-Storage Management –Protection and Security – Distributed Systems-Operating System Services – System Calls - Process Concept – Process Scheduling – Operations on Processes – Cooperating Processes – Inter-process Communication- Threads – CPU Scheduling: Scheduling criteria – Scheduling algorithms- Process Synchronization: The critical-section problem – Synchronization hardware – Semaphores – critical regions – Monitors.

MODULE - II **15**

Deadlock and Memory Management: Deadlock: System model – Deadlock characterization – Methods for handling deadlocks – Deadlock prevention – Deadlock avoidance – Deadlock detection – Recovery from deadlock. Memory Management: Background – Swapping – Contiguous memory allocation – Paging – Segmentation - Virtual Memory: Background – Demand paging – Page replacement –Thrashing.

MODULE - III **15**

File System Interface and Mass Storage Structure: File-System Interface: File concept – Access methods – Directory structure – Protection. File-System Implementation: Directory implementation – Allocation methods – Free-space management – I/O Systems – I/O Hardware – Application I/O interface – Kernel I/O subsystem – streams – Mass-Storage Structure: Disk scheduling –Disk management –Case study: Linux- Design Principles – Kernel Modules – Memory management-File Systems.

TOTAL : 45

TEXT BOOKS

1. Silberschatz Avi, Peter Baer Galvin, and Greg Gagne, "Operating System Concepts", Eighth Edition, John Wiley & Sons, Singapore, 2008.
2. Deital, Harvey M., "Operating Systems", Third Edition, Pearson Education, New Delhi, 2005.

REFERENCE BOOKS

1. Tanenbaum, Andrew S., "Modern Operating Systems", Second Edition, Pearson Education, New Delhi, 2004.
2. Gary Nutt., "Operating Systems", Third Edition, Pearson Education, New Delhi, 2004.
3. Dhamdhere D M, "Operating System: A Concept-Based Approach", Second Edition, Tata McGraw-Hill, New Delhi, 2006.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Examine the fundamentals of operating system and process management concepts
CO2: Categorize memory management techniques and solve problems using page replacement strategies
CO3: Identify deadlock situations and provide appropriate solutions
CO4: Paraphrase file, I/O and mass storage structures
CO5: Analyze the operating system principles with respect to Linux.

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Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	2	2	3		2				2		2	2	2
CO2	2	2	3		3				2		2	1	2
CO3	2	2	3		3				2		2		2
CO4	2	2	3		3				2		2		2
CO5	1	2	3		3				1		2	2	1

3 – Substantial, 2 – Moderate, 1 – Slight

11EC017 DIGITAL IMAGE PROCESSING

(Common to Mechatronics, ECE, EIE, and Information Technology branches)

3 0 0 3

MODULE – I **15**

Digital Image Fundamentals and Transforms: Elements of digital image processing systems- Elements of visual perception- psycho visual model- brightness- contrast- hue- saturation- mach band effect -Image sampling- Quantization - Basic relationship between pixels - Color image fundamentals - RGB- HSI models. Image Trasforms: 1D DFT- 2D transforms – DFT- DCT- Discrete Sine, Walsh- Hadamard, Slant- Haar, Hough Transform, KL transforms - properties of all transforms.

MODULE – II **15**

Image Enhancement and Restoration: Spatial domain enhancement: gray level transformations - histogram equalization - Image averaging- Spatial filtering: Smoothing, Sharpening filters– Frequency domain filters: Smoothing – Sharpening filters - Homomorphic filtering- Color image enhancement. Image Restoration: degradation model- Unconstrained and Constrained restoration- Inverse filtering - Wiener filtering.

MODULE – II **15**

Image Segmentation, Compression and Representation: Point- line and edge detection- Thresholding - Region based segmentation: Region splitting and merging. Need for data compression-Lossless compression-Lossy compression-compression standards. Image representation: chain codes – polygonal approximations – signatures – boundary segments – skeletons - Regional descriptors –Simple descriptors- Texture.

TOTAL: 45

TEXT BOOK

1. Gonzalez Rafael C and Woods Richard E, “Digital Image Processing”, Second Edition, Pearson Education, New Delhi, 2004.

REFERENCE BOOKS

1. Jain Anil K., “Fundamentals of Digital Image Processing”, Prentice Hall of India, New Delhi, 2002.
2. Salomon David., “Data Compression: The Complete Reference”, Second Edition, Springer, Verlag, New York, 2001.
3. Pratt William K, “Digital Image Processing”, John Wiley, New York, 2002.
4. http://nptel.ac.in/courses/Image processing
5. https://www.free-ebooks.net/

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: To implement the real time applications using various methods

CO2: To analyze and compare the performance with the conventional standards

CO3: To study the techniques for improving the quality of images

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	1										1		
CO2		2											
CO3									3		3		

1 – Slight, 2 – Moderate, 3 – Substantial

11EE013 ELECTRIC POWER UTILISATION AND ENERGY AUDITING

(common to EEE and EIE branches)

3 0 0 3

MODULE - I **15**

Tariff: Tariff calculation - Different types of tariff.

Illumination, Heating and Welding: Nature-of radiation –definition – laws photometry – polar curves – lighting calculations-design of illumination systems (for residential, industrial, commercial and street lightings) – types of lamps-energy efficient lamps. Methods of heating, requirement of heating material-design of heating element - furnaces – Welding generator, welding transformer and their characteristics

MODULE - II **15**

Electric Traction: Introduction – requirements of an ideal traction system – supply systems – mechanics of train movement – tractive effort – Specific energy consumption Traction motors and control – multiple units – braking methods – current collection systems-recent trends in electric traction – Details of Locomotives used in India.

MODULE - III **15**

Electrolytic Process and Storage of Electricity: Electrolysis – Polarization factor – Preparation of work for electroplating – tanks and other equipment – Nickel – iron and Nickel – cadmium batteries – components and materials – Lead acid Batteries - capacity rating of batteries – battery chargers – Method of charging and maintenance

Energy Conservation: Need for electrical energy conservation-methods – energy efficient equipment – energy management – energy auditing.-Features of Energy Conservation act 2001

Economics of power factor improvement – design for improvement of power factor using power capacitors – power quality and energy conservation – DSM techniques.

TOTAL: 45

TEXT BOOKS

1. Taylor. E. Openshaw, "Utilization of Electrical Energy in SI Units" Orient Longman Private Limited, New Delhi, 2003.
2. Gupta. J.B., "Utilization of Electric Power & Electric Traction", S.K. Kataria & Sons, New Delhi, 2002.

REFERENCE BOOKS

1. Soni, M.L., Gupta, P.V., Bhatnagar, V.S and Chakrabarti A., "A Text Book on Power System Engineering", Dhanpat Rai & Co., New Delhi, 1998.
2. Uppal, S.L., "Electrical Power", Khanna Publishers, New Delhi, 1988.
3. BEE reference

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Understanding the application of electrical energy for heating, lighting and Welding

CO2: Discuss electric traction systems and their performance

CO3: Discuss about electrolysis , electrical energy conservation, energy auditing and power quality

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	2	2	2		3			2				2	
CO2	2				3								
CO3	2	2	3		3					2	2	2	

1 – Slight, 2 – Moderate, 3 – Substantial

11EE702 ELECTRIC DRIVES AND CONTROL

(common to EEE and EIE branches)

3 0 0 3

MODULE – I **15**

Characteristics of Electric Drives: Motor load dynamics – steady state stability concepts - Speed – Torque characteristics of various types of loads and motors –duty cycles – heating and cooling curves – derivation -components of load torque

Selection of power rating for motors with regard to thermal overloading and load variation factors – load equalization – Starting and braking – multi quadrant operation and dynamics- Selection of drives and control schemes for Steel rolling mills, Paper mills, Lifts and Cranes.

MODULE - II **15**

DC and AC Drives: Speed control of DC motors – Ward–Leonard scheme – drawbacks – Thyristorized converter fed DC drives: Single, two and four quadrant operations – Chopper fed DC drives: control strategies – Single, two and four quadrant operations – Effect of ripples on the motor performance.

Speed control of three phase Induction Motors – Stator control: Stator voltage and frequency control – AC chopper, Inverter and cycloconverter fed Induction Motor drives, rotor control: Rotor resistance control– Static control of rotor resistance using DC chopper – Slip power recovery schemes: Static Krammer and Scherbius drives – Introduction to soft start, VFD and Vector Controlled Induction Motor Drives

MODULE - III **15**

Synchronous Motor Drives and Digital Control: Speed control of three phase Synchronous Motors– True synchronous and self controlled modes of operations – Inverter fed Synchronous Motors – Commutator less DC motors – Cyclo-converter fed Synchronous Motor – Effect of harmonics on the performance of AC motors

Digital techniques in speed control – Advantages and limitations

TOTAL : 45

TEXT BOOKS

1. Dubey, G. K., “Fundamentals of Electrical Drives”, Narosa Publishing House, New Delhi, 2003.
2. Bose, B.K., “Modern Power Electronics and AC Drives”, Pearson Education, New Delhi, 2003

REFERENCE BOOKS

1. Dubey. G. K., “Power Semiconductor Controlled Drives”, Prentice Hall of India, New Delhi, 1989.
2. Vedam Subramanyam, “Electric Drives: Concepts and Applications”, Tata McGraw –Hill, New Delhi, 2002.
3. Bose, B.K., “Power Electronics and Variable frequency Drives: Technology and Applications”, IEEE, Press, Inc. New York, 1997.
4. Krishnan R, “ Electric Motor Drives - Modeling, Analysis and Control”, Prentice Hall of India, New Delhi, 2002.
5. Boldea, Ion and Nasar, S. A., “Electric Drives”, CRC Press LLC, New York, 1999.
6. S.K.Pillai A First course on Electrical Drives , New age Publishers Ltd. Second edition, 1988

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Perform steady-state analysis on the common electric drives configuration.

CO2: Select suitable Electrical Drives for industrial applications.

CO3: Apply modern digital control techniques for various drives.

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO_1	2	1											
CO_2											2	3	
CO_3											2	3	

1-Slight, 2-Moderate, 3-Substantial

11EI603 BIOMEDICAL INSTRUMENTATION

(Common to Mechatronics, EEE and EIE branches)

3 0 0 3

MODULE - I **15**

Human Physiology and Measurement: Brief review of Human physiology and anatomy – Cell and its structure – Action and Resting Potential- propagation of action potential – Sodium pump – Nervous system: CNS – PNS – Nerve cell – Synapse. Transducers for body temperature measurements: Piezo–electric, Photoelectric, pressure transducers for physiological measurements, Bio sensors. Basic components of a biomedical system – Electrode-Electrolyte Interface. Electrodes: Micro, needle and surface electrodes.

MODULE - II **15**

Electro-Physiological Measurements: ECG, EEG, EMG, ERG and EOG: Lead systems and recording methods – Typical waveforms. Electrocardiograph measurements, Vectorcardiograph, Phonocardiograph- Blood pressure measurement- Ultrasonic method, Sphygmomanometer – Blood flow measurement by electromagnetic flow meter – Cardiac output measurement by dilution method and Fick‟s method –Blood pH measurement- Blood Sugar measurement.

MODULE - III **15**

Medical Imaging Systems and Therapeutic Equipments: X-ray machine – Computer tomography – MRI – Ultrasonography – Endoscopy – Different types of biotelemetry systems. Heart lung machine –Pacemakers – Defibrillators – Ventilators – Nerve and muscle stimulators – Diathermy – Audio meters – Dializers.

TOTAL : 45

TEXT BOOKS

1. Cromwell, Leslie, Weibell. Fred J. and Pfeiffer. Erich A., “Bio-Medical Instrumentation and Measurements”, Second Edition, Pearson Education, New Delhi, 2002.
2. Khandpur R.S., “Handbook of Bio-Medical instrumentation”, Tata McGraw-Hill Publishing Co Ltd., New Delhi, 2003.

REFERENCE BOOKS

1. Arumugam M., “Bio-Medical Instrumentation”, Anuradha Agencies, Kumbakonam, 2003.
2. Webster J., “Medical Instrumentation”, John Wiley & Sons, New York, 1995.
3. Rajarao C. and Guha S.K., “Principles of Medical Electronics and Bio-medical Instrumentation”, Universities press (India) Ltd, New Delhi, 2000.
4. Anandanatarajan.R., “Biomedical Instrumentation and Measurements”, PHI Learning Private Limited, New Delhi, 2011
5. http://www.biomed.mtu.edu/~osoykan/classes/be3600/note2003/14jan03.pdf
6. http://www.biomed.mtu.edu/~osoykan/classes/be3600/note2003/note2003.htm
7. http://biomedikal.in/2009/12/lecture-notes-on-biomedical-instrumentation/
8. http://pdfcloude.us/ebook.php?asin=0070473552

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Acquire the basics of human physiology and measurement of various internal parts

CO2: Understand the concepts of electro-physiological measurements.

CO3: Bring out the importance of imaging techniques, medical assistance techniques and therapeutic equipments.

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3		3										
CO2			1							2	1		
CO3	3										1		

1 – Slight, 2 – Moderate, 3 – Substantial

11EI013 ENVIRONMENTAL INSTRUMENTATION

3 0 0 3

MODULE – I **15**

Definition, Constituents and Review of Standard Methods: Environmental Definition, Constituents, biochemical cycle, causes of pollution, types of pollution and their measurements, effects of pollution, Different sensors for measurement of pollution, difference between off-line Measurement and continuous monitoring. Environmental Toxicology and Hazards, Common toxic agents, their analysis and safety measures, environmental regulations and standards.

Review of standard methods of pollution analysis, Sampling Operations, Devices and techniques as related to environmental engineering. Air Pollution Analysis: Analysis of Aerosols and Monitoring of gaseous pollutants. like SO2, H2S, NO-NOx, CO-CO2, Ozone, NH3 and organic gases, Vapor analysis, Monitoring of suspended particulate matter and trace metal pollutants

MODULE – II **15**

Water Pollution and Effluent Analysis: Water Pollution Analysis Physical Examination – color, conductivity, temperature, odour, turbidity, hardness. Chemical Characterization – Ca 2+, Mg2+, Na+, Cl-, SO4 2+, HCO3-, Al3+, Ba2+Boron, F-, NO2-, PO4 3-, Fe3+ Mn2-, SiO2 2-, Biological Investigations – DO, BOD, bacteriological examination, and types of water quality monitoring instruments (pH meters, conductivity meters etc.) Physical Methods of characterization: density, viscosity, temperature, conductivity, turbidity, volatile, and dissolved solids, oil and Immiscible liquids, color, odour, radioactivity, and analysis of organic pollutants. BOD, COD, TOC, Specific analysis of Organic pollutants, Analysis of metal pollutants, Analysis of anion and dissolved gases dissolved oxygen, pH, dissolved chlorides, suspended solids, nitrogen, and sludge index.

MODULE - III **15**

Soil Pollution, Pesticide Analysis, Wastewater Treatment and HVAC: Soil pollution and Pesticide Analysis: Analysis of Micronutrients, trace element pesticides, Chromatographic Characterization, Polarographic and Spectroscope Analysis of pesticides.(a) Noise pollution and its Measurement: Units, Devices and maps Noise Control System.(b) Radiation pollution and its Measurement and Control. Instrumentation Setup for different types of pollution control like wastewater treatment, HVAC Control etc. Environmental testing, Dry heat, Dry cold, Damp heat, Salt Spray, Dust, Altitude bump, Vibration Drop/Topple, free fall and study of ISO 14001.

TOTAL : 45

TEXT BOOKS

1. Khopkar, S.M., "Environmental Pollution Analysis", Wiley Eastern, New Delhi, 1993.
2. Campbell, M., "Sensor System for Environmental Monitoring", Blackie Academic and Professional, London, 1997

REFERENCE BOOKS

1. Khopkar, S. M. "Basic Concepts of Analysis Chemistry", New Age International Publishers, NewDelhi, 1985
2. Peavy, Howard S., Rowe. Donald R and Tchobanoglous. George., "Environmental Engineering", Tata McGraw-Hill Publishing Company Ltd, New Delhi, 1985.
3. http://nptel.ac.in/courses/Environmental Engineering

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: understand the environmental pollution and the methods of analysis
CO2: analyze the technical facts for air pollution
CO3: analyze the technical facts for water pollution
CO4: do treatment of effluents and analysis of noise pollution

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1			1		1			1					
CO2			2		2			2					
CO3			3		3			3					
CO4			4		4			4					

1 – Slight, 2 – Moderate, 3 – Substantial

11EI014 FIBER OPTICS AND LASER INSTRUMENTATION

3 0 0 3

MODULE – I **15**

Fundamentals of Optical Fibers: Principles of light propagation through fiber –different types of fibers and their properties– fiber fabrication– transmission characteristics of optical fiber: absorption losses, scattering losses, dispersion. Optical sources: LED-LD – optical detectors: PIN and APD.

Fundamentals of Laser: Fundamental characteristics of Lasers – three level and four level lasers – properties of laser – laser modes – resonator configuration – types of lasers: gas lasers, solid lasers, liquid lasers and semi conductor lasers.

MODULE-II **15**

Industrial Application of Optical Fibers: Fiber optic sensors – fiber optic instrumentation system – different types of modulators – different types of interferometers– interferometric method of measurement of length – measurement of pressure, temperature, current, voltage, liquid level and strain – fiber optic gyroscope.

Industrial Application of Laser: Laser for measurement of distance, length velocity, acceleration, current, voltage and atmospheric effect – material processing – Laser instrumentation for material processing: laser heating, welding, melting and trimming of materials, removal and vaporization.

MODULE-III **15**

Hologram and Medical Applications: Holography : basic principle, methods – holographic interferometry – holography for non-destructive testing – medical applications of lasers – laser and tissue interaction – laser instruments for surgery, removal of tumors of vocal cords, brain surgery, plastic surgery, gynecology and oncology – Laser Safety

TOTAL : 45

TEXT BOOKS

1. Keiser G., “Optical Fiber Communication”, McGraw Hill, New York, 1991.
2. Ghatak A.K and Thiagarajar K, “Optical Electronics Foundation Book”, Tata McGraw-Hill, New Delhi, 1991.

REFERENCE BOOKS

1. John and Harry, “Industrial Lasers and Their Applications”, McGraw Hill, New York, 1974.
2. Senior J.M., “Optical Fiber Communication: Principles and Practice”, Prentice Hall, New Jersey, 1985.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: To expose the students to the basic concepts of optical fibers and their properties
CO2: To provide adequate knowledge about industrial applications of Lasers
CO3: To provide adequate knowledge about Holography and Medical applications of Lasers

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3												
CO2											3	2	
CO3	3				3			3					

1 – Slight, 2 – Moderate, 3 – Substantial

11EI015 OPTIMAL CONTROL

(Common to Mechatronics and EIE branches)

3 1 0 4

MODULE – I **15**

Introduction: State space representation – Linearization - Review of matrix theory - Eigen values and Eigen vectors - Vector norms - Matrix transformations - Vector/matrix calculus - Optimization techniques - Static optimization - Constrained and unconstrained - Kuhn-Tucker conditions.

MODULE – II **15**

Optimal Control Formulation: Objective - Selection of performance index - Calculus of variation - Boundary condition- Optimum of a functional - Necessary condition of optimality - Hamiltonian approach-optimal control systems

MODULE - III **15**

LQR Design: LQR Problem formulation - Infinite time regulator problem - Riccati equation Constrained optimal control- Pontryagin minimum principle - Dynamic programming applied to discrete time systems.

Lecture: 45, Tutorial: 15, TOTAL: 60

TEXT BOOK

1. Kirk, Donald E., ”ptimal Control Theory: An Introduction”, Dover publications, 2004.
2. Desineni Subburam Naidu, “Optimal Control Systems”, CRC Press,2003

REFERENCE BOOKS

1. M.Gopal , “Modern Control System Theory”,Wiley Eastern ltd,1993
2. Anderson B.D.O. and Moore J.B., “Optimal Control: Linear Quadratic Methods”, Prentice Hall, New Jersey, 1979.
3. https://onlinecourses.nptel.ac.in/noc17_ee11
4. https://ocw.mit.edu/courses/aeronautics-and-astronautics/16-323-principles-of-optimal-control-spring-2008/lecture-notes

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: To study the matrix theory and optimization techniques

CO2: To study the optimal control formulation

CO3: To study the design of Linear Quadratic Regulator(LQR)

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3								2				
CO2					3				2				
CO3					3				2			1	

1 – Slight, 2 – Moderate, 3 – Substantial

11EI016 COMPUTER ARCHITECTURE AND NETWORKS

3 0 0 3

MODULE – I **15**

Introduction to Computer Architecture: Functional units - Basic operational concepts - Bus structures – Software – Performance – Memory locations and addresses – Memory operations – Instruction and instruction sequencing – Addressing modes – Basic I/O Operations. Basic Processing Unit - Fundamental concepts – Execution of a complete instruction – Pipelining – Data hazards – Instruction hazards. Memory System – Semiconductor RAMs - ROMs – Cache memories - Virtual memory- Secondary storage. I/O Organization - Accessing I/O devices – Interrupts – Direct Memory Access

MODULE - II **15**

Introduction to Computer Networks, Physical Layer and Data Link Layer: Introduction to Data Communications - Components– Data flow – Networks – Criteria, physical structures and Categories – Topologies – Protocols and Standards – ISO / OSI model- TCP/IP- Physical Layer - Transmission Modes - Transmission Media –Guided media – Data Link Layer - Block coding - cyclic codes– check sum – Data Link Control – Noisy Channels – stop and wait – go back-N ARQ – selective repeat ARQ – HDLC – Point-to-Point protocols, Multiple access – Random access – controlled access – Wired LAN - Connecting devices.

MODULE – III **15**

Network Layer, Transport Layer and Application Layer: Network Layer - Internetworks – IPV4 –IPV6 – ARP - RARP – ICMP – Unicast routing protocols – Intra and inter-domain routing - Distance Vector Routing – Link State Routing – path vector routing. Transport Layer - UDP - TCP – Congestion Control – Quality of services (QoS) – Application Layer - Domain Name Space (DNS) – Remote Logging – Email - FTP – HTTP – WWW

TOTAL : 45

TEXT BOOKS

1. Hamacher, V.Carl, Vranesic, Zvonko and Zaky, Safwat., "Computer Organization", Fifth Edition, McGraw Hill, New York, 2002.
2. Forouzan, Behrouz A., "Data communication and Networking", Fourth Edition, Tata McGraw-Hill, New Delhi, 2008.

REFERENCE BOOKS

1. Patterson, David A. and Hennessy, John L., "Computer Organization and Design: The Hardware/Software Interface", Fourth Edition, Elsevier, Amsterdam, 2009.
2. Tenenbaum, Andrew S. "Computer Networks", Fourth Edition, Pearson Education, New Delhi, 2004.
3. Stallings, William, "Data and Computer Communication", Eighth Edition, Pearson Education, New Delhi, 2007.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: To have a thorough understanding of the basic structure and operation of a digital computer.

CO2: To study the different ways of communicating with I/O devices.

CO3: To make the students to get familiarized with the concepts of computer networks

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3			2									
CO2	3			2								2	3
CO3				2								2	2

1 – Slight, 2 – Moderate, 3 – Substantial

11EI017 ADAPTIVE CONTROL

3 0 0 3

MODULE-I **15**

Mathematical Model:

Mathematical models of I order, II order, I order with pure delay and higher order systems – discretisation techniques and computer solution of differential equations – simulation of process dynamics – state models. System identification procedure. Simulation and Prediction. Non-parametric time and frequency domain methods.

MODULE-II **15**

System Identification Methods:

Conventional techniques of identification – identifications of systems with dead time – discrete systems – ARMA process – discrete state model – least squares techniques – recursive lest squares algorithms

State estimation:

Parameter estimation methods, minimizing prediction errors, linear regressions and Least squares method, Instrumental – variable method, prediction error method. Recursive algorithms. Closed-loop Identification.

MODULE-III **15**

Adaptive Control: Close loop and open loop adaptive control. Self-tuning controller Auto tuning for PID controllers: Relay feedback, pattern recognition, correlation technique.

Adaptive predictor control: Auto-tuning and self-tuning Smith predictor. generalized predictive control

TOTAL : 45

TEXTBOOKS

1. Chang C. Hong, Tong H. Lee and Weng K. Ho, Adaptive Control, ISA press, Research Triangle Park, 1993.
2. Nelles. O, Nonlinear System Identification, Springer Verlag, Berlin, 2001

REFERENCE BOOKS

1. Ljung .L, System Identification: Theory for the user, Prentice Hall, Englewood Cliffs,1987.
2. Astrom .K, Adaptive Control, Second Edition, Pearson Education Asia Pvt Ltd, 2002
3. Sastry S. and Bodson M. Adaptive control Stability, Convergence and Robustness,Prentice Hall, 1989 aaclab.mit.edu/material/lect
4. iberzon.csl.illinois.edu/teaching/13ece517notes.pdf

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: To provide introduction to modeling and system identification

CO2: To introduce the concept of model reference adaptive control, self tuning control systems

CO3: To impart implementation aspects of adaptive control, and applications.

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3								2				
CO2					3				2				
CO3					3				2			1	

1 – Slight, 2 – Moderate, 3 – Substantial

11EI602 INSTRUMENTATION SYSTEM DESIGN

3 1 0 4

MODULE-I **15**

Design of Signal Conditioning Circuits and Symbols: Interfacing primary elements with end devices - design of the bridge circuits - amplifiers for strain gauge – RTD - design of reference junction compensation - linearizing circuits for thermocouple – thermistor - design of charge amplifiers - design of square root extractors for variable head flow meters. Choice of valve body, materials – flow - lift characteristics – control valve sizing - piping and instrumentation diagrams - ISA symbols - process - instrumentation (PI) diagram of typical process plants.

MODULE-II **15**

Instrumentation Controllers: Smart transmitters – design of pneumatic - electronic controllers -design of instrumentation servo mechanism - design of annunciators: low level, high level annunciators. Design of interfacing circuits - orifice sizing for flow measurements - preparation of instrumentation project - process flow sheets -instrument index sheet - instrument specification sheet for pressure - choice of temperature – flow – level - analytical instruments -control panels

MODULE-III **15**

Design using Operational Amplifiers and PCB Design: Design of instrumentation amplifiers – multivibrators – comparators – active filers: low and high pass – PCB board design guide lines – layout scheme – single and multilayer PCB.

Lecture: 45 , Tutorial :15, TOTAL : 60

TEXT BOOKS

1. Doebelin, E.O., “Measurement Systems: Application & Design”, Fifth Edition McGraw-Hill Book Co., New Delhi, 2004.
2. Sheingold, D.H., “Transducer Interfacing Handbook: The guide to analog signal conditioning”, Analog devices Inc.,

REFERENCES BOOKS

1. Anderson, N.A., “Instrumentation for Process Measurements”, Chilton book company, Pennsylvania, 1980.
2. Liptak, B.G., “Instrument Engineers' Handbook Process Control and Optimization”, CRC Press; 4 edition.
3. Andrew, W., “Applied Instrumentation in Process Industry”, Volume - II. Gulf publications, 1990.
4. Johnson, C.D., “Process Control Instrumentation Technology”, Fourth Edition, Prentice Hall of India, New Delhi, 1995.
5. nptel.ac.in/courses/117108107/17

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Understand the concepts of I.S.
CO2: Design of various signal conditioning modules
CO3: Formulate the project for various process industries
CO4: Implement amplifier and filters in signal conditioning modules.

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3		3	1			1						
CO2			3	1	2		1						
CO3				1	3		1					3	
CO3	3						1						

1 – Slight, 2 – Moderate, 3 – Substantial

11EI019 OPTIMIZATION TECHNIQUES

3 1 0 4

MODULE – I **15**

Linear Models and Network Models: The phases of operations research study- Linear programming - Graphical method - Simplex algorithm – Dual Simplex - Transportation problems - Traveling salesmen problems - Assignment models - Applications to problems with discrete variables. Network models - Shortest route - Minimal spanning tree - Maximum flow models - Project network - CPM and PERT networks - Critical path scheduling - Sequencing models.

MODULE – II **15**

Inventory Models Sequencing Models: Inventory models - Economic order quantity models - Quantity discount models - Stochastic Inventory models - Multi product models - Inventory control models in practice. Sequencing Models - Sequencing problem: Models with n jobs with 2 machines – Problem with n jobs with 3 machines.

MODULE – III **15**

Queuing Theory and Replacement Models: Queuing models - Queuing systems and structures - Notation - parameter - Single Server and multi server models - Poisson input - Exponential service - Constant rate service - Infinite population - Simulation.

Replacement models - Replacement of items that deteriorate with time - Value of money changing with time – Not changing with time – Optimum replacement policy – Individual and group replacement.

Lecture:45, Tutorial: 15, TOTAL: 60

TEXT BOOKS

1. Taha, H.A., "Operations Research", Sixth Edition, Prentice Hall of India, New Delhi, 2002.
2. Hira and Gupta, "Introduction to Operations Research", S.Chand and Co., New Delhi, 2002.

REFERENCE BOOKS

1. Kanti Swarup, "Operations Research", Sultan Chand & Sons, New Delhi, 1995.
2. Rao, Singiresu S.., "Engineering Optimization Theory and Practice", New Age International, New Delhi, 2006.
3. Sharma, J. K, "Operations Research: Theory and Applications", Longman/ English Language Book Society, London, 2001.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Understand the usage of linear programming and PERT & CPM

CO2: Solve problems of inventory control, scheduling and sequencing of production runs.

CO3: Solve problems in queuing theory and replacement models

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3										3		
CO2			2		3								
CO3			2		3						3	1	

1 – Slight, 2 – Moderate, 3 – Substantial

11EI020 VLSI FOR SIGNAL PROCESSING

3 1 0 4

MODULE – I **15**

Introduction to DSP Systems, Iteration Bound and Pipelining and parallel processing: Introduction To DSP Systems -Typical DSP algorithms; Iteration Bound – data flow graph representations, loop bound and iteration bound, Algorithms for Computing Iteration Bound, Iteration Bound of Multirate Data Flow Graphs. Pipelining and parallel processing – Pipelining of FIR digital filters, parallel processing, pipelining and parallel processing for low power.

MODULE– II **15**

Retiming, Unfolding, Folding: Retiming - definitions and properties Retiming techniques; Solving systems of inequalities, Retiming Techniques. Unfolding – an algorithm for Unfolding, properties of unfolding, Critical path Unfolding and Retiming applications of Unfolding- sample period reduction and parallel processing application; Folding – Folding transformation – Register minimizing techniques –Register minimization in folded architectures.

MODULE-III **15**

Fast Convolution, Algorithmic strength reduction and Pipelined and parallel recursive filters : Fast convolution – Cook-Toom algorithm, modified Cook-Took algorithm. Algorithmic strength reduction in Filters-Parallel FIR Filters, DCT and Inverse DCT, Parallel architectures for rank order Filters. Pipelined and parallel recursive filters – inefficient/efficient single channel interleaving, Look- Ahead pipelining in first- order IIR filters, Look-Ahead pipelining with power-of-two decomposition, parallel processing of IIR filters, combined pipelining and parallel processing of IIR filters.

Lecture: 45, Tutorial: 15, TOTAL : 60

TEXT BOOK

1. Parhi, Keshab K., "VLSI Digital Signal Processing Systems, Design and Implementation", John Wiley, Inter Science, New York, 1999.

REFERENCE BOOKS

1. Isamail, Mohammed and Fiez, Terri, "Analog VLSI Signal and Information Processing", McGraw-Hill, New York, 1994.
2. Bayoumi Magdy A., and Swartzlander E., "VLSI Signal Processing Technology", Kluwer Academic Publishers. 1994.
3. Ray Liu K J, "High Performance VLSI Signal Processing, Innovative architectures and Algorithms", IEEE Press,1998
4. nptel.ac.in/courses/117101105/downloads/L1.pdf

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Provide a comprehensive coverage of techniques for designing efficient DSP architectures

CO2: Understand the architectural optimization both at block level as well as logic level are considered to realize architectures that can process high throughput data.

CO3: Know the concepts of pipelined adaptive filters

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	2		3										
CO2	2		3						2				
CO3	2		3						2				

1 – Slight, 2 – Moderate, 3 – Substantial

11GE011 ENTREPRENEURSHIP DEVELOPMENT

(Common to all Engineering and Technology branches except Civil Engg.)

3 0 0 3

MODULE – I **15**

Entrepreneurship Concepts: Meaning and Concepts of Entrepreneurship – Definition and Characteristics of an Entrepreneur – Entrepreneurial Process – The scope of Entrepreneurship in India. Entrepreneurial Motivation – Factors creating Entrepreneurship – Classification of Entrepreneurs – Intrapreneurship - Barriers to Entrepreneurship – Creativity, Innovation & Entrepreneurship - Role of Entrepreneurship in Economic Development.

MODULE – II **15**

Business Plan: Business Planning Process – Idea generation, Environmental Scanning, Feasibility Analysis, Drawing Functional Plan - Marketing Plan – Production/Operations Plan –Organizational Plan – Financial Plan – Human Resource Plan – Project Report Preparation , Evaluation, Control and Review.

MODULE – III **15**

Managing a Small Business: Sources of Finance - Institutions Supporting Entrepreneurs - EDPs. Small Scale Industry – The Strengths and Weaknesses of Small Business - Growth strategies – Sickness - Evaluation, Symptoms, Causes and Assessment – Rehabilitation of Sick Industries.

TOTAL :45

TEXT BOOKS

1. Madhurima Lall and Shikha Sahai, " Entrepreneurship", Excel Books, New Delhi, 2006
2. S.S.Khanka, " Entrepreneurial Development", S.Chand & Company Ltd, 2005

REFERENCE BOOKS

1. Robert D Hisrich, Michael P Peters and Dean A Shepherd, "Entrepreneurship", Sixth Edition, Tata McGraw Hill, New Delhi, 2009.
2. Mary Coulter, "Entrepreneurship in Action", Second Edition, Prentice Hall of India, New Delhi, 2005.
3. Jain P.C., "Handbook for New Entrepreneurs", Oxford University Press, Oxford, 2003.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: understand the concepts of entrepreneurship, the traits of an entrepreneur and the sources of his motivation

CO2: understand the components of a business plan

CO3: understand the institutions supporting entrepreneurship, nature of small business and causes of industrial sickness

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1						3							3
CO2				3		3	3	1					3
CO3				3			3			2			3

3 – Substantial, 2 – Moderate, 1 – Slight

11MT012 MICRO ELECTRO MECHANICAL SYSTEMS

(Common to Mechatronics, ECE, EEE, and EIE branches)

3 0 0 3

MODULE - I **15**

Microsystems, Microsensors and Actuators: Overview-Microsystems - Working principle of Microsystems - Scaling laws - Scaling in geometry - Scaling in rigid body dynamics - Scaling in electrostatic forces - Scaling in electromagnetic forces - Scaling in electricity - Scaling in fluid mechanics - Scaling in heat transfer - Micro actuation techniques - Micro sensors- Micropump – Micromotors – Microvalves – Microgrippers - Micro accelerometers.

MODULE - II **15**

Micro System Fabrication Process and Manufacturing: Substrates - Single crystal silicon wafer formation – Photolithography - MEMS materials - Ion implantation - Diffusion - Oxidation - CVD - Physical Vapor Deposition - Deposition by epitaxy - Etching process - Bulk Micromanufacturing Surface Micromachining – LIGA - SLIGA

MODULE - III **15**

Micro System Design and Application: Micro system packaging – Materials - Die level - Device level - System level - Packaging techniques - Surface bonding - Wire bonding – Sealing - Design considerations - Process design - Mask layout design - Applications of micro system in – Automotive - Bio medical – Aero space – Telecommunications field. Basic exposure to software for MEMS design - Intellisuite

TOTAL: 45

TEXT BOOKS

1. Gad-el-Hak, Mohamed, "The MEMS Hand book", CRC Press, Florida, 2002.
2. Tai-Ran Hsu, "MEMS and Microsystems: Design and Manufacture", Tata McGraw-Hill, New Delhi, 2006.

REFERENCE BOOKS

1. Fatikow, S. and Rembold, U, "Microsystem Technology and MicroRobotics", Springer-Verlag, Berlin Heidelberg, 1997.
2. Gardner, Julian W., Varadan, Vijay K. and AwadelKarim Osama, O., "Microsensors MEMS and Smart Devices", John Wiley & sons, New York, 2001.
3. Marc Madou, Fundamentals of Microfabrication, CRC press, New York, 1997
4. W.Trimmer, Editor, Micromechanics and MEMS: Classic and Seminar papers to 1990, IEEE press, 1996.
5. Tay, Francis E.H. and Choong, W.O, "Microfludics and BioMEMS Applications", Springer, Berlin, 2002.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Acquire the fundamental knowledge of standard Microsystems design fabrication and manufacturing techniques

CO2: Understand the working principles of micro sensors and actuators

CO3: Selection of materials for MEMS system design

CO4: Know the major classes components and applications of MEMS systems

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	K	l	m
CO1	3		3										
CO2					1						3	2	
CO3			3										
CO4								3					

1 – Slight, 2 – Moderate, 3 – Substantial

11MT702 ROBOTICS AND MACHINE VISION SYSTEM

(Common to Mechatronics, EEE and EIE branches)

3 0 0 3

MODULE - I **15**

Introduction and End Effectors: History - Basic components of robot - Laws of robotics – Technical specification of robot- Robot degree of freedom- Types of joints - Work space – Dexterity - Accuracy - Resolution – Repeatability of robot - Robot End Effectors – Singularity – Redundant and parallel manipulator – Economics consideration - Sociological consequence of robot – Robotics application current and future.

MODULE - II **15**

Robot Kinematics: Introduction – Position analysis and finite translations, rotations and transformations – Homogeneous transformations, skews symmetric matrices - Forward & inverse kinematics - Velocity and static force Analysis for serial manipulator.

Robot Dynamics: Acceleration of rigid body, Newton‟s equation, Euler equation, Newton-Euler dynamic formulation, Lagrangian formulations.

MODULE - III **15**

Trajectory planning and Robot programming: Point to point, continuous path control, Joint trajectory, Cartesian trajectory, trajectory planning – Introduction to robot programming.

Machine Vision: Image acquisition - Digital images - Sampling and quantization - Levels of computation - Feature extraction - Windowing technique – Segmentation – Thresholding - Edge detection - Binary morphology - Grey morphology – 3D vision. Case study: Ball sorting on a conveyor system depending on size.

TOTAL: 45

TEXT BOOKS

1. Groover, M.P., “Industrial Robotics: Technology, Programming and Applications”, McGraw-Hill, New York, 2003.
2. Craig, John. J., “Introduction to Robotics: Mechanics and Control”, Second Edition, Pearson Education, New Delhi, 2002.

REFERENCE BOOKS

1. Fu, K.S., Gonzalez, R.C. and Lee, C.S.G., “Robotics: Sensing, Vision and Intelligence”, Tata McGraw-Hill, New Delhi, 1987.
2. Dair, Gorden M., “Industrial Robotics”, Prentice Hall International, New Jersey, 1988.
3. Deb, Sathya Ranjan, “Robotics Technology and Flexible Automation”, Sixth Edition, Tata McGraw-Hill, New Delhi, 2003.
4. Niku, Saeed.B “Introduction to Robotics: Analysis, Systems, Applications”, New Delhi: Prentice Hall of India Pvt Ltd, 2005.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: provide a detailed appreciation of the concepts of robotics

CO2: with particular on kinematics of robots and the interpretation of sensory information

CO3: robot programming in connection with computer control

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	1											3	
CO2	1		2					3					
CO3			3					3					

1 – Slight, 2 – Moderate, 3 – Substantial

11MA601 PROBABILITY AND STATISTICS

(Common to EEE, EIE and Food Technology branches)

3 1 0 4

MODULE – I **15**

Probability and Random Variables: Axioms of probability- Conditional probability – Total probability – Baye‟s theorem – Random variable – Probability mass function – Probability density function – Moments- Moment generating functions.

MODULE – II **15**

Discrete Distributions: Binomial distribution – Poisson distribution - Geometric distribution.

Continuous Distributions: Uniform distribution – Exponential distribution - Normal distribution and its properties.

MODULE – III **15**

Testing of Hypothesis: Small and large samples – Tests concerning simple means- Comparing means – Proportions – Test for independence - Test for equality of variances- goodness of fit.

Design of Experiments: Analysis of variance- One way classification – Completely Randomized Design - Two way classification – Randomized Block Design – Latin Square Design.

Lecture 45, Tutorial : 15, TOTAL : 60

TEXT BOOKS

1. Gupta, S.C. and Kapoor, V.K., “Fundamentals of Mathematical Statistics”, Sultan Chand & Sons, New Delhi,Ninth Edition 2011.
2. Miller and Freund‟s, “Probability and Statistics for Engineers”, Eighth Edition, Prentice Hall of India Pvt. Ltd., New Delhi, 2010.

REFERENCE BOOKS

1. Kandasamy P., Thilagavathi K. and Gunavathi K., “Probability Statistics and Queuing Theory”, S. Chand & Co., New Delhi,Fourth Edition 2010.
2. Veerarajan T., “Probability, Statistics and Random Processes”, Tata McGraw-Hill, New Delhi,Third Edition 2010.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Discuss the concepts of basic probability and random variables.
CO2: Decide the appropriate distribution to be applied to solve industrial problems.
CO3: Predict the various tests for handling the large and small samples.
CO4: Test the degree to which two or more groups vary in experimental observations

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3	3		1	2							1	
CO2	3	3		1	2							1	
CO3	3	3			2							1	
CO4	3	3		1	2							1	

3 – Substantial, 2 – Moderate, 1 – Slight

11CH604 PROCESS MODELLING AND SIMULATION

(Common to Chemical and EIE branches)

3 1 0 4

MODULE – I **15**

Introduction to Modelling: Physical Modelling, Mathematical Modelling, Chemical Systems Modelling - Principles of Formulation - Fundamental Laws used in Modelling, Representation of Model, Model Building, Types of Modelling Equations.

Mathematical Modelling: Classification based on – Independent and Dependent Variables and Parameters - Variation of Independent Variables - State of the Process - Types of the Process, Boundary Condition, Black Box Principles.

MODULE - II **15**

Modelling of Chemical Systems-I: Process Description and Mathematical Model Aspects of: Flow Through a Pipe, Cone Shaped Tank, Stirred Tank Heater, Two Stirred Tank Heater, Double Pipe Heat Exchanger, Triple Effect Evaporator, Flash Drum.

Modelling of Chemical Systems-II: Process Description and Mathematical Model Aspects of: Batch Reactor, CSTR and CSTR with Heat Removal, CSTR in series, Tubular Reactor, Compartmental and Ideal Binary Distillation Model.

MODULE - III **15**

Process Simulation: Introduction, Scope of process simulation, Formulation of problem, Simulation approach for steady state process – Modular Approaches to Process Simulation, Equation Solving Approach.

Process Simulator: Introduction, Structure of Process Simulator, Professional Simulation Packages: ASPEN and HYSYS - Selection of Proper Equation of State/Fluid packages - Available Unit Operation Models.

Lecture: 45, Tutorial: 15, TOTAL: 60

TEXT BOOKS

1. Babu B.V, "Process Plant Simulation", Oxford University Press, New Delhi, 2004.
2. Luyben W.L, "Process Modelling, Simulation and Control for Chemical Engineers", Second Edition, McGraw Hill Book Co., New York, 1990.

REFERENCE BOOK

1. Gaikwad R.W and Dhirendra, "Process Modeling and Simulation", Second Edition, Denett & Co., Nagpur, 2006.
2. Amiya K. Jana, "Chemical Process Modelling and Computer Simulation", Prentice Hall of India, 2008.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Understand the fundamentals of modelling and their applications to transport/energy equations, chemical and phase equilibria kinetics etc.

CO2: Create the mathematical models of stirred tank heaters, Heat exchangers, Evaporators, Reactors and distillation columns.

CO3: Analyze the simulation principles of steady state processes like gravity tank, CSTR in series and other process operations by utilizing software tools like ASPEN PLUS, HYSYS and can select proper equation of state for estimating component properties and process flow sheeting.

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	2				3				2			3	
CO2	2	2			3				2			3	
CO3	2	2			3				2		2	3	

1 – Slight, 2 – Moderate, 3 – Substantial