Bapatla Engineering College

(*Autonomous*)

BAPATLA

B.Tech

Electronics and instrumentation Engineering

Curriculum Effective from A.Y. 2018-19 (R18 Regulations)

Bapatla Engineering College:: Bapatla

(Autonomous underAcharyaNagarjuna University)

(Sponsored by Bapatla Education Society)

BAPATLA - 522102 Guntur District, A.P.,India

www.becbapatla.ac.in

Bapatla Engineering College::Bapatla

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Department of Electronics and Instrumentation Engineering

COURSE STRUCTURE

Course Structure Summary:

S.No.	Category	Proposed	Percentage
1	Humanities & Social Science including Management Courses	13	7.83
2	Basic Science Courses	24	14.46
3	Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc.	25	15.06
4	Professional Core Courses	64	38.56
5	Professional Elective Courses	18	10.85
6	Open Elective Courses	6	3.61
7	Project work, seminar and internship in industry or elsewhere	12	7.23
8	Industry Internship	2	1.2
9	MOOCs	2	1.2
8	Mandatory Courses [Environmental Studies, Biology, Indian Constitution, Essence of Indian Traditional Knowledge etc]	(non-credit courses)	--
	Total:-	**166**	**100**

Semester wise Credits

SEMESTER	Credits
SEMESTER – I	18
SEMESTER – II	20
SEMESTER – III	20
SEMESTER – IV	22
SEMESTER – V	24
SEMESTER – VI	19
SEMESTER – VII	24
SEMESTER – VIII	19
Total	**166**

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First Year B. Tech (SEMESTER – I)

Code No.	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
		L	T	P	Total	CIE	SEE	Total Marks	
18MA001	Linear Algebra and Ordinary Differential Equations	3	1	0	4	50	50	100	3
18PH001	Physics -1 waves and optics	4	1	0	5	50	50	100	4
18CY001	Engineering Chemistry	4	0	0	4	50	50	100	3
18EL001	Communicative English	3	0	0	3	50	50	100	2
18ME001	Engineering Graphics	2	0	4	6	50	50	100	3
18PHL01	Physics Lab	0	0	3	3	50	50	100	1
18ELL01	English communications and skills laboratory	0	0	3	3	50	50	100	1
18MEL01	Workshop	0	0	3	3	50	50	100	1
	TOTAL	16	2	13	31	400	400	800	18

CIE: Continuous Internal Evaluation SEE: Semester End Examination
L: Lecture, T: Tutorial, P: Practical

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First Year B. Tech(SEMESTER – II)

Code No.	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
		L	T	P	Total	CIE	SEE	Total Marks	
18MA002	Numerical Methods and Advanced Calculus	4	0	0	4	50	50	100	3
18PH003	Semiconductor Physics and Nano Materials	4	0	0	4	50	50	100	3
18EI203	Instrumentation & Nanotechnology	4	0	0	4	50	50	100	3
18EE002	Basic Electrical Engineering	4	0	0	4	50	50	100	3
18CP001	Programming for Problem Solving	4	0	0	4	50	50	100	3
18CE001	Environmental Studies	3	0	0	3	50	50	100	2
18CYL01	Chemistry Lab	0	0	3	3	50	50	100	1
18CPL01	Programming Lab	0	0	3	3	50	50	100	1
18EEL01	Basic Electrical Engineering Lab	0	0	3	3	50	50	100	1
	TOTAL	23	0	9	32	450	450	900	20

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Second Year B. Tech(SEMESTER – III)

Code No.	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
		L	T	P	Total	CIE	SEE	Total Marks	
18MA003	Probability and Statistics	3	1	0	4	50	50	100	3
18EI302	Electronic Devices Circuits	3	1	0	4	50	50	100	3
18EI303	Digital Electronics	3	1	0	4	50	50	100	3
18EI304	Network Theory	3	1	0	4	50	50	100	3
18EI305	Elements of Mechanical Engineering	4	0	0	4	50	50	100	3
18EI306	Professional Ethics and Human Values	3	0	0	3	50	50	100	2
18EIL31	Electronic Devices Lab	0	0	3	3	50	50	100	1
18EIL32	Digital Electronics Lab	0	0	3	3	50	50	100	1
18EIL 33	Simulation Lab (Net Works)	0	0	3	3	50	50	100	1
	TOTAL	**19**	**4**	**9**	**32**	**450**	**450**	**900**	**20**

CIE: Continuous Internal Evaluation SEE: Semester End Examination
L: Lecture T: Tutorial P: Practical

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Second Year B. Tech(SEMESTER – IV)

Code No.	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
		L	T	P	Total	CIE	SEE	Total Marks	
18MA004	Complex Analysis and Special functions	3	1	0	4	50	50	100	3
18EI402	Electrical & Electronic Measurements	4	1	0	5	50	50	100	4
18EI403	Signals & Systems	4	1	0	5	50	50	100	4
18EI404	Analog Electronic Circuits	4	1	0	5	50	50	100	4
18EL002	Technical English	3	0	0	3	50	50	100	2
18CE002	Biology for Engineers	3	0	0	3	50	50	100	1
18EIL41	Analog Electronic Circuits Lab	0	0	3	3	50	50	100	2
18EIL42	Measurements Lab	0	0	3	3	50	50	100	1
18EIL43	Signals and Systems Lab	0	0	3	3	50	50	100	1
	TOTAL	**21**	**4**	**9**	**34**	**450**	**450**	**900**	**22**

CIE: Continuous Internal Evaluation SEE: Semester End Examination

L: Lecture T: Tutorial P: Practical

MOOCS COURSE CREDITS - 2

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Third Year B. Tech(SEMESTER – V)

Code No.	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
		L	T	P	Total	CIE	SEE	Total Marks	
18EI501	Control Systems	4	1	0	5	50	50	100	4
18EI502	Transducers	3	1	0	4	50	50	100	3
18EI503	Linear Integrated Circuits & Applications	3	1	0	4	50	50	100	3
18EI504	Microcontrollers	3	1	0	4	50	50	100	3
18EID11…4	Program Elective - 1	3	1	0	4	50	50	100	3
18EI506	Python Programming	3	0	2	5	50	50	100	3
18EIL51	Transducers Lab	0	0	3	3	50	50	100	1
18EIL52	Micro Controllers Lab	0	0	3	3	50	50	100	1
18EIL53	Simulation Lab (Control Systems)	0	0	3	3	50	50	100	1
	MOOCS								2
	TOTAL	19	5	11	35	450	450	900	24

CIE: Continuous Internal Evaluation SEE: Semester End Examination

L: Lecture T: Tutorial P: Practical

Program Elective - I

1) Analog and Digital Communications

2) Computer Organization

3) Intelligent sensors and instrumentation

4) Telemetry and SCADA

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Third Year B. Tech(SEMESTER – VI)

Code No.	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
		L	T	P	Total	CIE	SEE	Total Marks	
18EI601	Industrial Instrumentation	3	1	0	4	50	50	100	3
18EI602	Process Control	4	1	0	5	50	50	100	4
18EI603	Digital Signal Processing	3	1	0	4	50	50	100	3
18EID21…4	Program Elective - 2	3	1	0	4	50	50	100	3
18EI605	OOPS With JAVA	3	1	0	4	50	50	100	3
18EI606	Constitution of India	3	0	0	3	50	50	100	0
18EIL61	Process Control Lab	0	0	3	3	50	50	100	1
18EIL62	Digital Signal Processing Lab	0	0	3	3	50	50	100	1
18ELL63	Technical English Lab	0	0	3	3	50	50	100	1
	TOTAL	19	5	9	34	450	450	900	19

CIE: Continuous Internal Evaluation SEE: Semester End Examination
L: Lecture T: Tutorial P: Practical

Program Elective – 2
1) Digital Control Systems
2) Internet of Things
3) Robotics and Automation
4) Optimization in Engineering Design

SUMMMER INTURNSHIP – CREDITS - 2

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Fourth Year B. Tech(SEMESTER – VII)

Code No.	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
		L	T	P	Total	CIE	SEE	Total Marks	
18EI701	Management-1	4	0	0	4	50	50	100	3
18EI702	Biomedical Instrumentation	4	0	0	4	50	50	100	3
18EI703	Analytical Instrumentation	4	0	0	4	50	50	100	3
18EID31…4	Program Elective -3	3	1	0	4	50	50	100	3
18EID41…4	Program Elective – 4	3	1	0	4	50	50	100	3
18…I11..2	*Institution Elective – 1*	3	1	0	4	50	50	100	3
18EIL71	PROJECT - I	0	0	5	5	50	50	100	2
18EIL72	BMI Lab	0	0	1	3	50	50	100	1
18EIL73	AI Lab	0	0	1	3	50	50	100	1
	INTEURN SHIP								2
	TOTAL	21	3	7	35	450	450	900	24

CIE: Continuous Internal Evaluation SEE: Semester End Examination

L: Lecture T: Tutorial P: Practical

Program Elective – 3

1) Digital Image Processing.

2) Embedded Systems

3) CMOS and Analog IC design.

4) Non Linear and Robust Control

Institution Elective – 1

Program Elective -4

1) Data Communications

2) Bio signal processing

3) Artificial intelligence

4) Wireless Sensor Networks.

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Fourth Year B. Tech(SEMESTER – VIII)

Code No.	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
		L	T	P	Total	CIE	SEE	Total Marks	
18EID51…4	Program Elective-5	3	1	0	4	50	50	100	3
18EID61…4	Program Elective-6	3	1	0	4	50	50	100	3
18..I21..2	*Institution Elective-2*	3	1	0	4	50	50	100	3
18EIP81	Project-II	0	0	20	20	75	75	150	10
	TOTAL	9	3	20	32	225	225	450	19

CIE: Continuous Internal Evaluation SEE: Semester End Examination
L: Lecture T: Tutorial P: Practical

Program Elective - 5
1) virtual instrumentation
2) Instrumentation for Aerospace and Navigation
3) Programmable logic controllers.
4) Nuclear Medicine

Institution Elective – 2

Program Elective - 6
1) Optoelectronics and laser instrumentation
2) Medical Imaging
3) Advanced Sensors
4) Adaptive Control Systems

Institutional Elective-I

S.No.	Code	Course Title
1	**18CEI01**	Air Pollution & Control
2	**18CEI02**	Sustainable Water and Sanitation
3	**18CSI01**	Java Programming
4	**18CSI02**	Database Management Systems
5	**18ECI01**	Consumer Electronics
6	**18ECI02**	Embedded Systems
`7	**18EEI01**	Application of Wavelets to Engineering Problems
8	**18EEI02**	Industrial Electrical Systems
9	**18ITI01**	Data Analytics
10	**18ITI02**	Cyber Security
11	**18MEI01**	Fluid Power and Control Systems
12	**18MEI02**	Project Management
13	**18MAI01**	Linear Algebra
14	**18PHI01**	Nano-Materials and Technology
15	**18PHI02**	Fiber Optic Communication
16	**18HUI01**	System Thinking
17	**18ELI01**	English for Competitive Examinations
18	**18ELI02**	Professional Communication

Institutional Elective-2

S.No.	Code	Course Title
1	**18CEI03**	Disaster Management
2	**18CEI04**	Remote sensing & GIS
3	**18CSI03**	Python Programming
4	**18CSI04**	Computer Networks
5	**18ECI03**	Artificial Neural Network
6	**18ECI04**	Internet of things(IoT)
`7	**18EEI03**	High Voltage Engineering
8	**18EEI04**	Energy Auditing and Conservation
9	**18ITI03**	Mobile Application Developments
10	**18ITI04**	Web Technology
11	**18MEI03**	Non-Conventional Energy Sources
12	**18MEI04**	Automobile Engineering
13	**18MAI02**	Graph Theory
14	**18PHI03**	Advanced Materials
15	**18PHI04**	Optical Electronics
16	**18HUI02**	Organizational Psychology
17	**18HUI03**	Telugu Modern Literature
18	**18ELI03**	English Through Media

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Electronics and Instrumentation Engineering

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First Year B. Tech (SEMESTER – I)

Linear Algebra and Ordinary Differential Equations
(Code: 18MA001)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment :			50	Semester End Examination (3 Hours) :			50

Prerequisites: None

Course Objectives:

CO1: To learn about solving a system of linear homogeneous and non-homogeneous equations, finding the inverse of a given square matrix and also its Eigen values and Eigen vectors.

CO2: Identify the type of a given differential equation and select and apply the appropriate analyticaltechnique for finding the solution of first order and higher order ordinary differential equations.

CO3: Create and analyze mathematical models using first and second order differential equations to solve application problems that arises in engineering.

CO4: To learn about solving linear Differential equations with constant coefficients with the given initial conditions using Laplace transform technique.

Course Outcomes: Students will be able to

CLO-1: Apply elementary row operations to find the rank of a matrix, to solve a system of linear equations and to find the inverse of a matrix.

CLO-2:Find the Eigen values and Eigen vectors of the given square matrix and also compute the higher powers of the given matrix.

CLO-3: Solve separable, linear, exact differential equations with and without initial conditions.

CLO-4:Distinguish between linear and non-linear differential equation.

CLO-5: Write the piecewise continuous functions in terms of unit step functions and hence find its Laplace transforms.

CLO-6: Solve linear differential equation with constant coefficients and unit step input functions using Laplace transforms technique.

SYLLABUS

UNIT - I

Linear Algebra: Rank of a Matrix; Elementary transformations of a matrix; Gauss-Jordan method of finding the inverse; Consistency of linear System of equations: Rouches theorem, System of linear Non-homogeneous equations, System of linear homogeneous equations; vectors; Eigen values; properties of Eigen values(without proofs); Cayley-Hamilton theorem (without proof).

[Sections: 2.7.1; 2.7.2; 2.7.6; 2.10.1; 2.10.2; 2.10.3; 2.12.1; 2.13.1; 2.14; 2.15.]

UNIT - II

Differential Equations of first order: Definitions; Formation of a Differential equation; Solution of a Differential equation; Equations of the first order and first degree; variables separable; Linear Equations; Bernoulli‟s equation; Exact Differential equations; Equations reducible to Exact equations: I.F found by inspection, I.F of a Homogeneous equation, In the equation M dx+ N dy=0. Applications of a first order Differential equations: Newton‟s law

of cooling; Rate of decay of Radio-active materials. [Sections: 11.1; 11.3; 11.4; 11.5; 11.6; 11.9; 11.10; 11.11; 11.12.1; 11.12.2; 11.12.4; 12.6; 12.8] [12 Hours]

UNIT – III

Linear Differential Equations: Definitions; Theorem; Operator D; Rules for finding the complementary function; Inverse operator; Rules for finding the Particular Integral; Working procedure to solve the equation; Method of Variation of Parameters; Applications of Linear Differential Equations: Oscillatory Electrical Circuits. [Sections: 13.1; 13.2.1; 13.3; 13.4; 13.5; 13.6; 13.7;13.8.1;14.1;14.5] [12 Hours]

UNIT – IV

Laplace Transforms: Definition; conditions for the existence; Transforms of elementary functions; properties of Laplace Transforms; Transforms of derivatives; Transforms of integrals; Multiplication by tn; Division by t; Inverse transforms- Method of partial fractions; Other methods of finding inverse transforms; Convolution theorem(without proof); Application to differential equations: Solution of ODE with constant coefficients using Laplace transforms. [Sections:21.2.1; 21.2.2; 21.3; 21.4; 21.7; 21.8; 21.9; 21.10; 21.12; 21.13; 21.14; 21.15.1] [12 Hours]

TEXT BOOK: B.S.Grewal, “Higher Engineering Mathematics”, 44thedition, Khanna publishers, 2017.

REFERENCE BOOKS: [1] ErwinKreyszig, “Advanced Engineering Mathematics”, 9th edition, John Wiley & Sons. [2] N.P.Bali and M.Goyal, “A Text book of Engineering Mathematics” Laxmi Publications, 2010.

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First Year B. Tech (SEMESTER – I)

Waves and Modern Physics (Engineering Physics-1) (CODE-18PH001)
(Common for ECE,EEE,EIE)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment :			50	Semester End Examination (3 Hours) :			50

COURSE OBJECTIVES

CO1: To familiarize the students in getting knowledge about modern optics and their Engineering applications.

CO2: To make aware of the students to obtain circuit knowledge regarding electrical, Electronics and Magnetism.

CO 3: To make the students to understand the quantum theory and solving the various Physical problems using quantum mechanics.

CO 4: To get the knowledge of various methods of analytical techniques for material testing.

COURSE OUTCOMES: Student will be able to

CLO1: Learn about principle and working of different types of lasers and their applications.

CLO2: Know about principle, types of optical fibres of their importance in communication.

CLO3: Analyse the electromagnetic principles in electrical and electronic circuits and Maxwell‟s equations.

CLO4: Study about quantum mechanics and its applications.

CLO5: Read about properties and applications of ultrasonics in various fields.

CLO6: Know about radio isotopes and their applications.

UNIT-I

(ADVANCED OPTICS) Lasers: Interaction of radiation with matter. Einstein co-efficients, Properties of laser,Population inversion, LASER principle, pumping schemes-Three level and four level laser, ypes of lasers: solid-state lasers (Ruby), gas lasers (He-Ne), Semiconductor lasers; applications of lasers in industry and medicine. Fibre Optics:Importance of optical fibre, Structure and principle of optical fibre, acceptance angle and numerical aperture, Types of optical fibres based on modes and refractive index, V-number, losses associated with optical fibres, ,fibre optical communication, advantages of optical fibres

UNIT-II

(ELECTRO-MAGNETIC INDUCTION AND MAXWELL'S EQUATIONS) Maxwell's equations in vacuum and conducting medium.Velocity of electromagnetic wave in vacuum. Electromagnetic oscillations in LC circuit, LCR series resonance in A.C circuit and resonant frequency, Quality factor. Concept of skin effect, Energy in an electromagnetic field; Flow of energy and Poynting vector.Principle of circulating charge and cyclotron, Hall Effect.

UNIT-III

(MODERN PHYSICS) Dual nature of light, Debroglie concept of matter waves, Davission-Germer experiment, Heisenberg uncertainty principle and applications (non existence of electron in nucleus and finite width of spectral lines), one dimensional time independent and

dependent Schrodinger wave equation, physical significance of wave function, application of Schrödinger wave equation to particle in a one dimensional potential box, concept of quantum tunnelling and construction and working of Scanning Tunnelling Electron Microscope.

UNIT-IV

(ANALYTICAL TECHNIQUES) Ultrosonics: Properties of ultrasonics, Production of ultrasonic waves by magnetostriction andpiezo-electric method, Determination of velocity of ultrasonic wave in liquids by Ultrasonic interferometer. Medical applications, Ultrasonic Imaging technique(Doppler Ultrasound Imaging advantages and limitations), industrial applications, NDT : Pulse echo technique, Time of flight diffraction technique. Nuclear Techniques: Radio isotopes and its applications (medical and Industrial), GM counter, Scintillation counter

Text Books: 1. Engineering physics M.V.Avadhanulu, P.G.KshirsagarS.Chand& Company Pvt. Ltd. 2. Engineering physics, PalaniSwamy,Scitech publication

Reference books: 1. Basic engineering physics – Dr.P.srinivasaRao, Dr.K.Muralidhar, HimalayaPublication 2. Applied physics - Dr.P.SrinivasaRao, Dr.K.Muralidhar, Himalaya publication.

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First Year B. Tech (SEMESTER – I)

Engineering Chemistry-1 (code: 18CY001)

(Common to all Branches)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment :			50	Semester End Examination (3 Hours) :			50

PREREQUISITES:None

COURSE OBJECTIVES: The student should be conversant:

CO1: With the principles of water characterization and treatment of water for industrial purposes and methods of producing water for potable purposes.

CO2: To understand the thermodynamic concepts, energy changes, concept of corrosion & its control.

CO3: With the conventional energy sources, solid, liquid and gaseous Fuels & knowledge of knocking and anti-knocking characteristics.

CO4: With aim to gain good knowledge of organic reactions, plastics, conducting polymers & biodegradable polymers.

COURSE OUTCOME: After studying this course, students will be able to:

CLO-1: Develop innovative methods to produce soft water for industrial use and potable water at cheaper cost.

CLO-2: Apply their knowledge in converting various energies of different systems and protection of different metals from corrosion.

CLO-3: Have the capacity of applying energy sources efficiently and economically for various needs.

CLO-4: Design economically and new methods of organic synthesis andsubstitute metals with conducting polymers and also produce cheaper biodegradable polymers to reduce environmental pollution.

UNIT I

Water Chemistry 15 hrs

Introduction: water quality parameters **Characteristics**: Alkalinity, Hardness - Estimation & simple neumerical problems, **Boiler Troubles** - Sludges, Scales, Caustic embrittlement, boiler corrosion, Priming and foaming; **Internal conditioning**- phosphate, calgon and carbonate methods. **External conditioning** - Ion exchange process & Zeolite proess WHO Guidelines, Potable water, Sedimentation, Coagulation, Filtration. Disinfection methods: Chlorination, ozonization and UV treatment. Salinity – Treatment of Brackish water by Reverse Osmosis and Electrodialysis.

UNIT II 15 hrs

Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies.Free energy and emf.Cell potentials, the Nernst equation and applications. **Corrosion:** Types of corrosion - Chemical or dry corrosion, Electrochemical or wet corrosion; Galvanic, stress, pitting and differential aeration corrosion; Factors effecting corrosion, **Corrosion control** – Cathodic protection, and electro plating (Au)&electoless Ni plating.

UNIT III: Fuels 15 hrs

Classification of fuels; Calorific value of fuels (lower, higher) **Solid fuels**: Determination of calorific value (Bomb Calorimeter) & related problems, Coal ranking, **Liquid Fuels:** Petroleum refining and fractions, composition and uses. Knocking and anti- knocking Agents, Octane number and Cetane number; Bio fuels- Biodiesel, general methods of preparation and advantages **Gaseous fuels:** CNG and LPG, Flue gas analysis – Orsat apparatus.

UNIT IV: 15 hrs

Organic reactions and synthesis of a drug molecule Introduction to reactions involving substitution (SN_1, SN_2), addition (Markownikoff‟s and anti-Markwnikoff‟s rules) , elimination (E_1& E_2), Synthesis of a commonly used drug molecule.(Aspirin and Paracetamol) **Polymers:** Conducting polymers: Classification, Intrinsic and Extrinsic conducting polymers and their applications**.** Plastics: Thermoplasts and thermosetting plastics, Bskelite and PVC. Bio degradable polymers: types, examples-Polyhydroxybuterate (PHB), Polyhydroxybuterate-co-β-hydroxyvalerate (PHBV), applications.

TEXT BOOKS:

1. P.C. Jain and Monica Jain, “Engineering Chemistry” DhanpatRai Pub, Co., New Delhi 17th edition (2017).

2. SeshiChawla, “Engineering Chemistry”DhanpatRai Pub, Co LTD, New Delhi 13 th edition, 2013.

REFERENCES:

1 Essential Of Physical Chemistry by ArunBahl, B.S. Bahl, G.D.Tuli, by ArunBahl, B.S. Bahl, G.D.Tuli, Published by S Chand Publishers, 12th Edition, 2012.

2 Text Book of Engineering Chemistry by C.P. Murthy, C.V. Agarwal, A. Naidu B.S. Publications, Hyderabad (2006).

3 Engineering Chemistry by K. Maheswaramma, Pearson publishers 2015.

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Electronics and Instrumentation Engineering

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First Year B. Tech (SEMESTER – I)

Communicative English
CODE:(18EL001)

Lectures	3	Tutorial	0	Practical	0	Credits	2
Continuous Internal Assessment :			50	Semester End Examination (3 Hours) :			50

UNIT-I

1.1 **Vocabulary Development**: Word formation-Formation of Nouns, Verbs & Adjectives from Root words-Suffixes and Prefixes

1.2 **Essential Grammar:** Prepositions, Conjunctions, Articles

1.3 **Basic Writing Skills**: Punctuation in writing

1.4 **Writing Practices**: Mind Mapping, Paragraph writing (structure-Descriptive, Narrative, Expository & Persuasive)

UNIT-II

2.1 **Vocabulary Development**: Synonyms and Antonyms

2.2 **Essential Grammar**: Concord, Modal Verbs, Common Errors

2.3 **Basic Writing Skills**: Using Phrases and clauses

2.4 **Writing Practices**: Hint Development, Essay Writing

UNIT III

3.1 **Vocabulary Development**: One word Substitutes

3.2 **Essential Grammar**: Tenses, Voices

3.3 **Basic Writing Skills**: Sentence structures (Simple, Complex, Compound)

3.4 **Writing Practices**: Note Making

UNIT IV

4.1 **Vocabulary Development**: Words often confused

4.2 **Essential Grammar**: Reported speech, Common Errors

4.3 **Basic Writing Skills**: Coherence in Writing: Jumbled Sentences

4.4 **Writing Practices**: Paraphrasing &Summarising

Reference Books

- Communication Skills, Sanjay Kumar &PushpaLatha. Oxford University Press:2011.
- Practical English Usage, Michael Swan. Oxford University Press:1995.
- Remedial English Grammar, F.T.Wood. Macmillan:2007.
- Study Writing, Liz Hamplyons& Ben Heasley. Cambridge University Press:2006

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

First Year B. Tech (SEMESTER – I)

Engineering Graphics I
(Code: 18MEL01)

Lectures	1	Tutorial	0	Practical	4	Credits	3
Continuous Internal Assessment :			50	Semester End Examination (3 Hours) :			50

Prerequisites: None

Course Objectives: To learn

CO1: clear picture about the importance of engineering graphics in the field of engineering

CO2: the drawing skills and impart students to follow Bureau of Indian Standards

CO3: To give an idea about Geometric constructions, Engineering curves, orthographic projections and pictorial projections

CO4: imagination skills about orientation of points, lines, surfaces and solids

CO5: basic drafting skills of AutoCAD

Course Outcomes: Students will be able to

CLO-1: draw projections of points and projections of lines using Auto CAD

CLO-2: plot projections of surfaces like circle, square and rhombus

CLO-3: plot the Projections of solids like Prisms and pyramids

CLO-4: convert the of Orthographic views into isometric views of simple objects

CLO-5: generate the of pictorial views into orthographic views of simple castings

UNIT – I

INTRODUCTION: Introduction to Drawing instruments and their uses, geometrical construction procedures **INTRODUCTION TO AUTOCAD:** Basics of sheet selection, Draw tools, Modify tools, dimensioning **METHOD OF PROJECTIONS:** Principles of projection - First angle and third angle projectionof points. Projection of straight lines.Traces of lines.

UNIT II

PROJECTIONS OF PLANES: Projections of plane figures: circle, square, rhombus, rectangle, triangle, pentagon and hexagon.

UNIT – III

PROJECTIONS OF SOLIDS: Projections of Cubes, Prisms, Pyramids, Cylinders and Cones Inclined to one plane.

UNIT –IV

ISOMETRIC PROJECTIONS: Isometric Projection and conversion of Orthographic views into isometric views. (Treatment is limited to simple objects only).

UNIT –V

ORTHOGRAPHIC PROJECTIONS: Conversion of pictorial views into Orthographic views. (Treatment is limited to simple castings).

TEXT BOOK:

1. Engineering Drawing with AutoCAD by Dhananjay M. Kulkarni (PHI publication)

2. Engineering Drawing by N.D. Bhatt & V.M. Panchal. (Charotar Publishing House, Anand). (First angle projection)

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

First Year B. Tech (SEMESTER – II)

Numerical Methods and Advanced Calculus
(Code: 18MA002)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment :			50	Semester End Examination (3 Hours) :			50

Prerequisites: None

Course Objectives: CO1: To learn about some advanced numerical techniques e.g. solving a nonlinear equation, linear system of equations, Interpolation and Approximation techniques.
CO2: To learn about evaluation of double and triple integrals and their applications.
CO3: To learn some basic properties of scalar and vector point functions and their applications to line,surface and volume integrals.

Course Outcomes: Students will be able to
CLO-1: Solve non-linear equations in one variable and system of linear equations using iteration methods.
CLO-2: Choose appropriate interpolation formulae based on the given data.
CLO-3: Compute the value of a definite integral using numerical integration techniques.
CLO-4: Predict the numerical solution of the derivative at a point from the given initial value problem using appropriate numerical method.
CLO-5 :Evaluate the double and triple integrals using change of variables.
CLO-6: Transformline integrals to surface and surface to volume integrals and evaluate them.

SYLLABUS

UNIT – I

Numerical Solution of Equations: Introduction; Solution of algebraic and transcendental equations: Bisection method, Method of false position, Newton-Raphson method; Useful deductions from the Newton-Raphson formula; Solution of linear simultaneous equations; Direct methods of solution: Gauss elimination method, Gauss-Jordan method, Factorization method; Iterative methods of solution: Jacobi‟s iterative method, Gauss-Seidel iterative method. [Sections: 28.1; 28.2; 28.3; 28.5; 28.6; 28.7.1;28.7.2]. [12 Hours]

UNIT - II

Finite differences and Interpolation: Finite differences: Forward differences, Backward differences; Newton‟s interpolation formulae: Newton‟s forward interpolation formula, Newton‟s backward interpolation formula; Interpolation with unequal intervals; Lagrange‟sinterpolation formula; Divided differences; Newton‟s divided difference formula; Numerical integration; Trapezoidal rule; Simpson‟s one-third rule; Simpson‟s three-eighth rule; Numerical solution of ODE‟s: Introduction; Picard‟s method; Euler‟s method; Runge-Kutta method. [Sections:29.1; 29.1-1; 29.1.2; 29.6; 29.9; 29.10; 29.11; 29.12; 30.4; 30.6; 30.7; 30.8; 32.1; 32.2; 32.4; 32.7]. [12 Hours]

UNIT – III

Multiple Integrals: Double integrals; Change of order of integration; Double integrals in polar coordinates; Area enclosed by plane curves; Triple integrals; Volumes of solids: Volume as Triple integrals, Change of variables. [Sections: 7.1; 7.2; 7.3; 7.4; 7.5; 7.6.2; 7.7.2]. [12 Hours]

UNIT – IV

Vector calculus and its Applications: Scalar and vector point functions; Del applied to scalar point functions-Gradient: Definition, Directional derivative; Del applied to vector point functions: Divergence, Curl; Line integral; Surfaces: Surface integral, Flux across a surface; Green‟s theorem in the plane (without proof); Stokes theorem (without proof); Gauss divergence theorem(without proof). [Sections: 8.4; 8.5.1; 8.5.3; 8.6; 8.11; 8.12; 8.13; 8.14; 8.16] [12 Hours]

TEXT BOOK: B.S.Grewal, "Higher Engineering Mathematics", 44thedition, Khanna publishers, 2017.

REFERENCE BOOKS: [1] ErwinKreyszig, "Advanced Engineering Mathematics", 9th edition, John Wiley & Sons. [2] N.P.Bali and M.Goyal, "A Text book of Engineering Mathematics" Laxmi Publications, 2010.

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

First Year B. Tech (SEMESTER – II)

Semiconductor Physics and Nano Materials
CODE:18PH003
(Common for CSE,IT,EEE,&EIE)

Lectures	3	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment :			50	Semester End Examination (3 Hours) :			50

Course Objectives:

CO1: This unit aim to build the foundation and inspires interest of freshmen into electrical and electronics and to focus on fundamental concepts and basic principles regarding electrical conduction.

CO2: This unit provides various properties of semiconductor materials and their importance in various device fabrications.

CO3: This unit aim to educate the student on various opto-electronic devices and their applications.

CO4: This unit provide information about the principles of processing, manufacturing and characterization of nanomaterials, nanostructures and their applications.

COURSE OUTCOMES: The students were able to

CLO1: understand concepts of band structure of solids, concept of hole and effective mass of electron in semiconductors.

CLO2: know the concept of Fermi level and various semiconductor junctions.

CLO3: familiar with working principles of various opto-electronic devices and their applications.

CLO4: understand importance of nano-materials and their characteristic properties.

UNIT -I

ELECTRONIC MATERILAS: Sommerfeld free electron theory, Fermi level and energy, density of states, Failure of free electron theory (Qualitative), Energy bands in solids, E-K diagrams, Direct and Indirect band gaps. Types of Electronic materials: Metals, Semi conductors and Insulators, Occupation Probability, effective mass, Concept of hole.

UNIT – II

SEMICONDUCTORS: Introduction to semiconductors, intrinsic and extrinsic semiconductors, carrier concentrations, Fermi level and temperature dependence, Continuity equation, Diffusion anddrift, P-N junction (V-I characteristics), Metal – Semiconductor junction (Ohmic and Schottky), Semiconductor materials of interest for opto- electronic devices.

UNIT-III

OPTO-ELECTRONIC DEVICES AND DISPLAY DEVICES: Photo voltaic effect, principle and working of LED, Applications of Photo diode, Solar cell, PIN & APD Diode, Liquid crystal display, Opto electric effect: Faraday Effect and Kerr effect.

UNIT-IV

NANO-MATERIALS: Introduction to nano technology, quantum confinement, surface to volume ratio, properties of nano materials, synthesis of nano-materials: CVD, sol-gel methods, laser ablation. Carbon nano tubes: types, properties, applications. Characterization of nano materials: XRD, SEM, applications of nano materials.

TEXT BOOKS:

1. A text book of engineering physics by Avadhanulu and KshirsagarS.Chand& Co. (2013)
2. Applied physics by Dr.*P.SrinivasaRao*. Dr.K.*Muralidhar*
3. Introduction to solid state state physics, Charles Kittel, 8th edition
4. Solid state physics, S.O. Pillai

REFERENCE BOOKS:

1. Text book on Nanoscience and Nanotechnology (2013): B.S. Murty, P. Shankar, Baldev Raj, B.B. Rath and J. Murday, Springer Science & Business Media.
2. Basic Engineering Physics ,Dr.*P.SrinivasaRao*. Dr.K.*Muralidhar.* Himalaya

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

First Year B. Tech (SEMESTER – II)

Instrumentation & Nanotechnology .

Code : 18 EI 203

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment :			50	Semester End Examination (3 Hours) :			50

PREREQUISITES:

COURSE OBJECTIVES:

The student should be conversant:

CO1: To make students understand the role of chemistry in various Nano particles.

CO2: To enhance knowledge about the various Nano synthetic techniques and their applications.

CO3: To introduce the students to basic principles, constructions and applications of different batteries.

CO4: To make students understand different analytical techniques and their importance.

COURSE OUTCOME:

After studying this course, students will be able to:

CLO-1: Having capacity to innovate a variety of nonmaterials for engineering applications

CLO-2: Design economically and new methods of synthesis nanomaterials.

CLO-3: Have the knowledge of converting various forms of energies into most needy electrical energy efficiently and economically to reduce usage of renewable energy sources.

CLO-4: Explain instrumentation and applications of UV-Visible, I.R spectroscopy, and various analytical techniques.

UNIT-I: 12Hrs.

Nano Chemistry

Introduction to Nano chemistry- Nanoparticles-properties, Introduction to Nanostructures: Carbon Nanotubes (CNT), Graphenes, Fullerenes,Nano Peapods, Quantum Dots and Semiconductor Nanoparticles Metal-based Nanostructures (Iron Oxide Nanoparticles) Nanowires Polymer-based Nanostructures including dendrimers.

UNIT-II: 12Hrs.

Synthesis of Nanoparticles

Chemical Vapour Deposition (CVD) Chemical precipitation and coprecipitation;Metalnanocrystals by reduction, Sol - gel synthesis - Microemulsions or reverse micelles, micelle formation – Chemical Reduction - Emulsions, and Dendrimers - Microwave heating synthesis - Sonochemical synthesis – Electrochemical synthesis - Photochemical synthesis. **Engineering applications**- Drug delivery, Fabric, Reactivity of materials, Micro/ Nano Electro mechanical systems.

UNIT-III: 12Hrs.

Batteries

Different types of batteries- primary, secondary and flowcells. Working principle and uses- Laclanche cell, alkaline battery, Ni-Cd battery and Lithium, Lithium ion batteries. Lead acid storage cell, charging and discharging principles- operation and uses, Solar battery-its working principle and applications, electrochemical sensors.

UNIT-IV: 12Hrs.

ANALYTICAL TECHNIQUES

Beer-Lambert‟s law (problem) – UV-visible and IR spectroscopy– principles, instrumentation (block diagram only) and Applications. Estimation of iron by colorimetry – flame photometry – principle – instrumentation (block diagram only) – estimation of sodium by flame photometry – atomic absorption spectroscopy – principles – instrumentation (block diagram only) – estimation of nickel by atomic absorption spectroscopy

TEXT BOOKS:

1. P.C. Jain and Monica Jain, “Engineering Chemistry” DhanpatRai Pub, Co., New Delhi (2002).
2. Rao C. N., A. Muller, A. K. Cheetham, “Nanomaterials Chemistry”, Wiley- VCH, 2007.

REFERENCE BOOKS:

1. B.K. Sharma “Engineering Chemistry” Krishna Prakasan Media (P) Ltd., Meerut (2001).
2. Engineering Chemistry J.C Kuriacase&J.Rajaram, Tata McGraw Hills co., New Delhi 1. (2004).
3. Text Book of Engineering Chemistry - ShasiChawla, DhanpatRai publishing company, New Delhi (2008).
4. Kenneth J. Klabunde, “Nanoscale materials in chemistry”, Wiley Interscience Publications, 2001.
5. Sergeev G.B., “Nanochemistry”, Elseiver publication, 2006.
6. Nanoparticles: From theory to applications – G. Schmidt, Wiley Weinheim 2004.
7. T. Pradeep, A Textbook of Nanoscience and Nanotechnology, Hardcover – 2012

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

First Year B. Tech (SEMESTER – II)

Basic Electrical Engineering *(E&I)*

(Code: 18EE002)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment :			50	Semester End Examination (3 Hours) :			50

Prerequisites: Mathematics, Physics

Course Objectives:

CO1: To understand basic Laws in circuits, analysis of simple DC circuits, Theorems and its applications.

CO2: To learn basic concepts of AC circuits, its analysis and analysis of three phase balanced circuits. CO3: To understand working principle, construction, applications and performance of DC machines, AC machines.

CO4: To gain knowledge about electrical insulators.

Course Outcomes: Students will be able to

CO1: Solve problems involving with DC excitation sources in electrical circuits.

CO2: Solve problems involving with AC excitation sources in electrical circuits.

CO3: Analyze construction, principle of operation, application and performance of DC machines and AC machines.

CO4: Aware importance of electrical insulators.

UNIT 1

DC Circuits Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff current and voltage laws, analysis of simple circuits with dc excitation.Superposition, Thevenin and Norton Theorems.Time-domain analysis of first-order RL and RC circuits.

UNIT-II

AC Circuits Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), Three-phase balanced circuits, voltage and current relations in star and delta connections.

UNIT-III

Electrical Machines Magnetic materials, BH characteristics, Construction, working of DC machines, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency.Auto-transformer and three-phase transformer connections.Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor.Construction and working of synchronous generators.

UNIT IV

Electrical Installations Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthling. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

TEXT BOOK:

1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", 4thedition, Tata McGraw Hill, 2010.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2012.

Reference Books:

1. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 1996.
2. E. Hughes, "Electrical and Electronics Technology", 10th edition, Pearson, 2011.
3. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 19

Environmental Studies

(Code: 14CE001)

Lectures	4	Tutorial	0	Practical	0	Credits	2
Continuous Internal Assessment :			50	Semester End Examination (3 Hours) :			50

Prerequisites: None

Course Objectives: To learn

CO1: To develop an awareness,knowledge, and appreciation for the naturalenvironment.

CO2: To understand different types of ecosystems exist in nature.

CO3: To know our biodiversity.

CO4: To understand different types of pollutants present in Environment.

CO5: To know the global environmental problems.

Course Outcomes: Students will be able to

CLO 1: Develop an appreciation for the local and natural history of the area.

CLO 2: Hope for the better future of environment in India which is based on many positive factors like Biodiversity, successive use of renewable energy resources and other resources, increasing number of people's movements focusing on environment.

CLO 3: Know how to manage the harmful pollutants.

CLO 4: Gain the knowledge of Environment.

CLO 5: Create awareness among the youth on environmental concerns important in the long-term interest of the society

UNIT – I

Introduction: Definition, Scope and Importance, Need for public awareness. Ecosystems: Definition, Structure and Functions of Ecosystems, types - Forest, Grassland, Desert, Aquatic (Marine, pond and estuaries). *6 periods* **Biodiversity:** Definition and levels of Biodiversity; Values of Biodiversity - Consumptive, Productive, Social, Aesthetic, Ethical and Optional; Threats and Conservation of Biodiversity; Hot Spots of Biodiversity, Bio-geographical Classification of India, India as a mega diversity nation. *Chipko movement case study 6 periods*

UNIT – II

Natural resources: Land: Land as a resource, Causes and effects of land degradation - Soil erosion, Desertification. **Forest**: Use of forests, Causes and effects of deforestation, Afforestation, Mining - benefits and problems. **Water**: Uses, floods and drought, Dams - benefits and problems.
Energy: Importance of energy, Environmental Impacts of Renewable and Non-renewable energy resources. *Silent Valley Project and Narmada BachaoAndolan case studies8 periods*
Sustainability: Definition, Concept and Equitable use of resources for sustainable development; Rain water harvesting and Watershed management. Fieldwork on Rain water harvesting and Watershed management. *6 periods + 6 hours field work/Demonstration*

UNIT – III

Pollution: Definition; Causes, effects and control of air, water and nuclear pollution; *Chernobyl Nuclear Disaster* case study; Solid Waste: urban, Industrial and hazardous wastes; Integrated waste management - 3R approach, composting and vermicomposting. *12 periods*
Environmental acts: Water and air (Prevention and Control of pollution) acts, Environmental protection act, Forest Conservation act. *6 periods*

UNIT – IV

Environmental issues: Green house effect & Global warming, Ozone layer depletion, Acid rains, Green Revolution, Population Growth and environmental quality, Environmental Impact Assessment.Environmental Standards (ISO 14000, etc.) *12 periods* **Case Studies:** Bhopal Tragedy, Mathura Refinery and TajMahal, and Ralegan Siddhi (Anna Hazare). *6 periods* **Field work:** Visit to a local area to document environmental assets – Pond/Forest/Grassland. Visit to a local polluted site- Urban and industry/ Rural and Agriculture. *6 hrs.*

TEXT BOOKS:

1. “Environmental Studies” by Benny Joseph, Tata McGraw-Hill Publishing Company Limited, New Delhi.
2. “Comprehensive environmental studies”- JP Sharma, Laxmi Publications.
3. Text Book of environmental Studies – ErachBharucha

REFERENCE BOOKS:

1. “Environmental studies”, R.Rajagopalan, Oxford University Press.

2. “Introduction to Environmental Science”, Anjaneyulu Y, B S Publications
3. “Environmental Science”, 11th Edition – Thomson Series – By Jr. G. Tyler Miller.

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

First Year B. Tech (SEMESTER – II)

PROBLEM SOLVING USING PROGRAMMING (Code:18CS001)

(Common for all branches except Civil Engineering)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment :			50	Semester End Examination (3 Hours) :			50

Prerequisites: BASIC MATHEMATICS

Course Objectives: Students will be able to

1. Understand basic concepts of C Programming such as: C-tokens, Operators, Input/output, and Arithmetic rules.
2. Develop problem-solving skills to translate „English" described problems into programs written using C language.
3. Use Conditional Branching, Looping, and Functions.
4. Apply pointers for parameter passing, referencing and differencing and linking data structures.
5. Manipulate variables and types to change the problem state, including numeric, character, array and pointer types, as well as the use of structures and unions, File.

Course Outcomes: After the course the students are expected to be able to

1. Choose the right data representation formats based on the requirements of the problem.
2. Analyse a given problem and develop an algorithm to solve the problem.
3. Use the comparisons and limitations of the various programming constructs and choose the right one for the task in hand.
4. Write the program on a computer, edit, compile, debug, correct, recompile and run it.
5. Identify tasks in which the numerical techniques learned are applicable and apply them to write programs, and hence use computers effectively to solve the task.

UNIT I (17 Periods)

Overview of C, Constants, Variables and Data Types, Operators and Expressions,Managing I/O Operations. Decision Making and Branching.

Programming Exercises for Unit I:C-expressions for algebraic expressions, evaluation of arithmetic and Boolean expressions. Syntactic and logical errors in a given program, output of a given program, values of variables at the end of execution of a program fragment, Programs using Scientific and Engineering formulae. Finding the largest of the three given numbers.Computation of discount amount on different types of products with different discount percentages. Finding the class of an input character, finding the type of triangle formed with the given sides, computation of income-tax, finding given year is leap year or not, and conversion of lower case character to its upper case.

UNIT II (17 Periods)

Decision Making and Looping, Arrays, Character Arrays and Strings. **Programming Exercises for Unit II:** To print the sum of the digits of a given number and to display the image of a given number. To find whether a given number is prime, printing Fibonacci sequence and to find prime

factors of a given number.To print graphic patterns of symbols and numbers.To find the length of a string, compare strings, reverse a string, copy a string and to find whether the given string is palindrome or not with and without using String Handling Functions. Transpose of a matrix and sorting of names using arrays.

UNIT III (18 Periods)

User-defined Functions,Structures and Unions,Pointers **Programming Exercises for Unit - III:** Functions - Recursive functions to find factorial & GCD (Greatest Common Divisor), string operations using pointers and pointer arithmetic. Swapping two variable values. Sorting a list of student records on register number using array of pointers

UNIT IV (18 Periods)

File Management in C,Dynamic Memory Allocation,Preprocessor **Programming Exercises for Unit - IV**: Operations on complex numbers, and to read an input file of marks and generate a result file, sorting a list of names using command line arguments. Copy the contents of one file to another file. Allocating memory to variables dynamically. **Text Book:**

1. Programming in ANSI C by E.Balaguruswamy,Fifth Edition.

References:

1. Kernighan BW and Dennis Ritchie M, “C programming language”, 2nded, Prentice Hall.
2. Yashavant P. Kanetkar, “Let us C”, BPB Publications.
3. Herbert Schildt, “C: The Complete Reference”, 4th edition, Tata Mcgraw-Hill.
4. Ashok N.Kamthane, “Programming in C”, PEARSON 2nd Edition.

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

First Year B. Tech (SEMESTER – II)

ENGINEERINGCHEMISTRY LABORATORY (Common to all branches)

(Code: 18CYL01)

Lectures	0	Tutorial	0	Practical	3	Credits	1
Continuous Internal Assessment :			50	Semester End Examination (3 Hours) :			50

LIST OF EXPERIMENTS

1. **Introduction to Chemistry Lab** (the teachers are expected to teach fundamentals likeCalibration of Volumetric Apparatus, Primary, Secondary Solutions, Normality, Molarity, Molality etc. anderror, accuracy, precision, theory of indicators, use of volumetric titrations).

2. **Volumetric Analysis:**

a. Estimation of Washing Soda.

b. Estimation of Active Chlorine Content in Bleaching Powder

c. Estimation of Mohr‟s salt by permanganometry.

d. Estimation of given salt by using Ion-exchange resin using Dowex-50.

3. Analysis of Water:

a. Determination of Alkalinity of Tap water.

b. Determination of Total Hardness of ground water sample by EDTA method

c. Determination of Salinity of water sample

4. **Estimation of properties of oil**:

a. Estimation of Acid Value

b. Estimation of Saponification value

5. Preparations:

a. Preparation of Soap

b. Preparation of Urea-formaldehyde resin

c. Preparation of Phenyl benzoate

6. Demonstration Experiments (Any two of the following):

a. Determination of pHof given sample.

b. Determination of conductivity of given sample by conductometer.

c. Potentiometric Determination of Iron.

TEXT BOOKS (for Chemistry 1 and 2):

1. Practical Engineering Chemistry by K.Mukkanti, Etal, B.S. Publicaitons, Hyderabad, 2009.

2. Inorganic quantitative analysis, Vogel, 5th edition, Longman group Ltd. London, 1979.

REFERENCE BOOKS:

1. Text Book of engineering chemistry by R.n. Goyal and HarrmendraGoel.

2. A text book on experiments and calculations- Engineering Chemistry. S.S. Dara.

3. Instrumental methods of chemical analysis, Chatwal, Anand, Himalaya Publications.

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

First Year B. Tech (SEMESTER – II)

Basic Electrical Engineering Lab

(Code: 18EEL02)

Lectures	0	Tutorial	0	Practical	3	Credits	1
Continuous Internal Assessment :			50	Semester End Examination (3 Hours) :			50

Lab experiments

1. Verification of KCL and KVL
2. Verification of Superposition theorem
3. Verification of Thevenin‟s theorem
4. Verification of Norton‟s theorem
5. Time domain analysis of RL series circuit
6. Time domain analysis of RC series circuit
7. Parameters of choke coil
8. Measurement of line and phase quantities in 3-phase star connected load
9. Measurement of line and phase quantities in 3-phase delta connected load
10. Measurement of low and medium resistance using volt ampere method
11. OC & SC test of single phase transformer
12. Load test on single phase transformer
13. Load test on three-phase induction motor
14. Speed control of three-phase induction motor
15. Fuse characteristics

Note: Minimum 10 experiments should be carried.

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

First Year B. Tech (SEMESTER – II)

Problem Solving using Programming(Lab)

(Code: 18CSL01)

Lectures	0	Tutorial	0	Practical	3	Credits	1
Continuous Internal Assessment :			50	Semester End Examination (3 Hours) :			50

1. A program for electricity bill taking different categories of users, different slabs in each category. (Using nested if-elsestatement).

Domestic Customer:		
Consumption Units	**Rate of Charges(Rs.)**	
0 – 200	0.50 per unit	
201 – 400	100 plus	0.65 per unit
401 – 600	230 plus	0.80 per unit
601 and above	390 plus	1.00 per unit
Commercial Customer:		
Consumption Units	**Rate of Charges(Rs.)**	
0 – 100	0.50 per unit	
101 – 200	50 plus	0.6 per unit
201 – 300	100 plus	0.70 per unit
301 and above	200 plus	1.00 per unit

2. Write a C program to evaluate the following (usingloops):
   a) 1 + x2/2! + x4 / 4!+ …upto tenterms
   b) x +x3/3! + x5/5!+ … upto ten terms
3. Write a C program to check whether the given numberis
   a) Prime ornot.
   b) Perfect or Abundant orDeficient.
4. Write a C program to display statistical parameters (using one – dimensionalarray).
   a) Mean
   b) Mode
   c) Median
   d) Variance.
5. WriteaCprogramtoreadalistofnumbersandperformthefollowingoperations
   a) Print thelist.
   b) Delete duplicates from thelist.
   c) Reverse thelist.

6. Write a C program to read a list of numbers and search for a given number using Binary search algorithm and if found display its index otherwise display the message “Element not found in theList”.

7. Write a C program to read two matrices and compute their sum andproduct.

8.Write a C program to read list of student names and perform the following operations a) To print the list of names. b) To sort them in ascending order. c) To print the list after sorting.

9. Write a C program that consists of recursive functions to a) Find factorial of a given number b) Solve towers of Hanoi with three towers (A, B & C) and three disks initially on tower A.

10. A Bookshop maintains the inventory of books that are being sold at the shop. The list includes details such as author, title, price, publisher and stock position. Whenever a customer wants a book the sales person inputs the title and the author, and the system searches the list and displays whether it is available or not. If it is not, an appropriate message is displayed, if it is, then the system displays the book details and request for the number of copies required ,if the requested copies are available the total cost of the requested copies is displayed otherwise the message “required copies not in stock” is displayed. Write a program for the above in structures with suitable functions.

11. Write a C program to read a data file of students’ records with fields(Regno, Name, M1,M2,M3,M4,M5) and write the successful students data (percentage > 40%) to a data file.

12. Write a C program to read a file as command line argument and count the given word frequency in a file

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Second Year B. Tech (SEMESTER – III)

PROBABILITY AND STATISTICS (18 MA 003)

Common to All Branches

Course category : Basic Sciences			**Course type : Theory**	
Lecture Hours: 3Hr./Week	**Tutorial : 1Hr.**	**C I E: 50M**	**SEE : 50M**	**Credits : 3**

Course Objectives :

CO1 : To provide principles of statistical methods and probability concepts that serves the foundations for the applications of methods in engineering.

CO2 : To educate the student on the applications of various t-tests to various problems in the field of engineering.

CO3 : To educate the student on the application of completely randomized designs (CRD) and randomized block designs (RBD) to different realistic problems in the field of engineering.

CO4 : To motivate the student on the applications of single and multiple regression analysis to the regression model arising in the field of engineering.

UNIT – I

Continuous Random Variables, Normal Distribution, Normal Approximation to the Binomial Distribution, Uniform Distribution, Gamma Distribution and its applications, Beta Distribution and its applications, Joint Distributions (Discrete),Joint Distributions (Continuous).Populations and Samples, Law of large numbers,Central limit theorem and its applications,The sampling distribution of the mean (σ unknown),The sampling distribution of the variance.

[12 Hours]

(Sections 5.1, 5.2, 5.3, 5.5,5.7, 5.8, 5.10, 6.1, 6.2, 6.3, 6.4 of Text Book [1])

UNIT – II

Point estimation, Interval estimation, Tests of Hypotheses, Null Hypothesis and Tests of hypotheses, Hypothesis concerning one mean, Comparisons-Two independent Large samples, Comparisons-Two independent small samples, Paired sample t test. (Sections 7.1,7.2, 7.4, 7.5, 7.6, 8.2, 8.3, 8.4 of Text Book [1]) [12 Hours]

UNIT-III

The estimation of variances,Hypotheses concerning one variance,Hypotheses concerning two variances, Estimation of proportions, Hypotheses concerning one proportion, Hypotheses concerning several proportions, Procedure for Analysis of Variance (ANOVA) for comparing the means of k (>2) groups- one way classification(Completely randomized designs), Procedure for Analysis of Variance (ANOVA) for comparing the means of k (>2) groups- two way classification(Randomized block designs). [12 Hours]

(Sections 9.1, 9.2, 9.3, 10.1, 10.2, 10.3, 12.2, 12.3 of Text Book [1])

UNIT -IV

Multivariate Analysis: The concept of bivariate relationship, scatter diagram, Pearson's correlation and correlation matrix. Simple linear regression model and assumptions, Least Squares Estimation of the parameters of the model, Testing the significance of the model.

Regression versus Correlation, Multiple linear regressionmodel with k explanatory variables and assumptions of the model. Least Square Estimation of regression coefficients. Concept of the coefficient of determination R^2. Test for significance of the regression model and individual regression coefficients.Applications of multiple regression analysis.
(1st and 2nd Chapters of Text Book [2]). [12 Hours]

Text BookS:

1. Miller & Freund's "Probability and Statistics for Engineers", Richard A. Johnson, 8th Edition, PHI.
2. Introduction to Linear Regression Analysis, Douglas C. Montgomery, E.A. Peck and G.G. Vining, 3rdedition, Wiley.

Reference BookS:

1. R.E Walpole, R.H. Myers & S.L. Myers 'Probability & Statistics for Engineers and Scientists', 6th Edition, PHI.
2. Fundamentals of Mathematical Statistics, S.C.Gupta and V.K.Kapoor,11th Edition, Sultan Chand & Sons.
3. Murray R Spiegel, John J.Schiller, R. AluSrinivasa, 'Probability &Satistics',

Schaum's outline series.

4. K.V.S.Sarma,'Statistics Made Simple – Do it yourself on PC',Prentice Hall India, Second Edition, 2015.

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Second Year B. Tech (SEMESTER – III)

ELECTRONIC DEVICES AND CIRCUITS (18EI302)

Course category : program core			Course type : Theory	
Lecture Hours: 3Hr.	Tutorial : 1Hr.	C I E: 50M	SEE : 50M	Credits : 3

Course Learning Outcomes:

CO-1 : Compute carrier concentrations in a semiconductor at a given temperature.
CO-2 : List basic equations for semiconductor operation
CO-3 : Draw energy band diagram for a p-n junction
CO-4 : Evaluate the current components as well as capacitance in a diode.
CO-5 : List carrier transport mechanism at various regions in a transistor
CO-6 : Distinguish the BJT configurations
CO-7 : Find the operating region of FET given the biasing voltages
CO-8 : Design FET biasing using current sources and current mirrors
CO-9 : Analyse FET amplifiers

UNIT-I

Fundamentals of Semiconductors : Semiconducting materials, elemental and compound semiconductors, the valence bond model of semiconductor, the energy band model, equilibrium concentrations of electrons and holes inside the energy bands, the Fermi level and energy distribution of carriers inside the bands, the temperature dependence of carrier concentrations in an extrinsic semiconductor, the drift of carriers in an electric field, conductivity, the Hall effect, carrier flow by diffusion, Einstein relations, methods of generating excess carriers in semiconductors, quasi Fermi level, basic equations for semiconductor device operation.

UNIT-II

p-n Junctions : Description of p-n junction action, the abrupt junction: calculation of built-in voltage, the electric field and potential distributions, p-n junction under bias, current components in a p-n diode, p-n diode Volt-Ampere equation, temperature dependence of I-V characteristic, static and dynamic resistance of diode, space charge capacitance , diffusion capacitance and electrical breakdown in p-n junctions

Bipolar Junction Transistor : The junction transistor, transistor current components, transistor as an amplifier, common base, common emitter and common collector configurations, self biasing of transistor, circuit models for transistor: h-parameter model and hybrid π model.

UNIT-III

Field effect Transistor : MOS capacitor, MOSFET, V-I characteristics of MOSFET, current voltage relationship in a MOSFET, small signal model of FET.

FET amplifiers at low frequencies : common source stage, source follower, common gate stage, source degenerated amplifier, swing limits, Cascade stage and cascode stage.

UNIT-IV

Current mirrors and biasing techniques: Basic current mirrors, cascode current mirrors, active current mirrors, CS biasing, CG biasing, source follower biasing, differential pair biasing.

Differential amplifiers : Single ended and differential operation, basic differential pair, common mode response, differential pair with MOS loads.

Text Books

1. Introduction to semiconductor materials and devices- M S Tyagi, Wiley publisher.

2. Design of Analog CMOS integrated circuits- Behzad Razavi, Mc-Graw Hill Education.
3. Integrated Electronics- Jacob Millman, Chritos C. Halkies, Tata Mc-Graw Hill,2009

Reference Books

1. Electronic Devices and circuits- Jacob Millman, Chritos C. Halkies, Tata Mc-Graw Hill
2. Transistors: Fundamentals for the integrated circuit engineer- R M Warner and B L Grung

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Second Year B. Tech (SEMESTER – III)

DIGITAL ELECTRONICS(18EI303)

Course Catogory : Program Core		Course Type : Theory		
Lecture Hours: 3Hr.	Tutorial : 1Hr.	C I E: 50M	SEE : 50M	Credits : 3

CO1 Perform binary arithmetic operations and correct single bit errors.
CO2 Simplify logical functions using K-map method and Tabulation method.
CO3 Design various combinational logic circuits and realize using logic gates.
CO4 Design and realize various sequential logic circuits using flip flops.
CO5 Explain the characteristics of different logic families.

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UNIT- I

Number Systems and Codes: Decimal, Binary, Octal and Hexadecimal number systems and their conversion. Binary Addition, Subtraction, Multiplication, Division. Sign-magnitude representation, 1's & 2's complement representations, Subtraction using Method of complements; Codes – BCD code, Excess-3 code, Gray code.

Boolean Algebra and Logic gates: Boolean Postulates & theorems, Digital Logic gates, Simplification of Boolean expression, Implementation of Boolean expressions using logic gates, Canonical and Standard forms.

UNIT- II

Minimization of Switching Functions: Simplification of logical functions using Karnaugh map method (Up to five variables), Don't-Care conditions, Quine-McCluskey minimization technique (Up to five variables).

Combinational Logic Design: General design Procedure, Half-Adder, Full-Adder, Half - Subtractor, Full - Subtractor, BCD to 7 segment decoder, Design of a Binary to Gray and Gray to Binary code converters.

UNIT- III

Combinational Logic Design Using MSI Circuits: Multiplexer, Combinational logic design using multiplexers, Demultiplexers/ Decoders and their use in combinational logic design. Magnitude comparator, Encoders.

Flip-Flops: Clocked S-R flip-flop, Preset and Clear, J-K flip-flop, Race around condition, Master slave J-K flip-flop, D flip-flop, T flip-flop, Excitation tables of flip-flops and flip-flop conversions

UNIT- IV

Sequential Logic Design: Analysis and Synthesis of Clocked sequential circuits, Shift register, Bi-directional shift register, Ring counter, Twisted- Ring counter. Asynchronous counters - UP/DOWN counters, Design of Synchronous counters

Logic Families: Characteristics of digital IC's, MOS Inverter, MOSFET NAND and NOR Gates, CMOS Inverter, CMOS NAND and NOR gates.

Programmable Logic devices: PLA, PAL, PROM

Text Book:

1. R P Jain "Modern Digital Electronics", IVth ed., TMH.

Reference Books

1. A.Anand Kumar, "Fundamentals of Digital Circuits", PHI 2006.
2. M.Morris Mano, "Digital Logic and Computer Design", PHI 2003.

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Second Year B. Tech (SEMESTER – III)

NETWORK THEORY (18EI304)

Course category : program core			**Course type : Theory**	
Lecture Hours: 3Hr.	**Tutorial : 1Hr.**	**C I E: 50M**	**SEE : 50M**	**Credits : 3**

CO1 Apply basic network reduction techniques for analysis of electrical circuits.

CO2 To learn the energy properties of electric elements and the techniques

CO3 Apply Network Theorems for DC and AC Circuits.

CO4 Analyze RL,RC,RLC circuits and understand response of circuits with excitations

CO5 Analyze transient response of circuits with dc and sinusoidal excitationsusing LT

CO6 Understand the concept of resonance and two port networks

UNIT I

INTRODUCTION OF CIRCUIT ELEMENTS: Circuit concept, Active and Passive circuit elements; Ideal, Practical and dependent sources and their V-I characteristics, Source transformation, Voltage and Current division; V-I characteristics of Passive elements and their series / parallel combination; Star Delta transformation, Energy stored in Inductors and Capacitors, Kirchhoff's Voltage law and Kirchhoff's Current law.

METHODS OF ANALYSIS: Nodal Analysis, Super Node Analysis, Mesh Analysis, Super Mesh Analysis. Nodal vs. Mesh analysis: A comparison

UNIT II

INTRODUCTION TO ALTERNATING CURRENTS AND VOLTAGES: Instantaneous, Peak, Average and RMS values of various waveforms; Concept of phase and phase difference in sinusoidal waveforms; Phase relation in pure resistor, Inductor and capacitor, series and parallel circuits, compound Circuits. Computation of active, reactive and complex powers, power factor

NETWORK THEOREMS: Superposition theorem, Thevenin's and Norton's theorems, Reciprocity, Compensation, Maximum power transfer theorem, and Millman's theorem, Application of theorems to DC circuits and AC circuits

UNIT III

RESONANCE: Series resonance, Impedance and phase angle, voltages and currents, bandwidth and Q factor, Parallel resonance, resonant frequency, variation of impedance with frequency, Q factor,.

TRANSIENTS ANALYSIS: Steady state and transient response, Source free, DC and Sinusoidal response of an R-L, R-C circuits. R-L-C series and parallel circuits: over damped, Critical damping and under damped parallel RLC circuit.

UNIT IV

LAPLACE TRANSFORMS: Definition of the Laplace Transform. Properties of the Laplace Transform , Inverse Laplace transforms, Initial and final value theorem, Transforms of typical signals, periodic functions, Applications of Laplace transforms in circuit analysis.

TWO PORT NETWORKS: One-port and two-port networks, driving point impedance and admittance, open-, and short circuit parameters.

TEXT BOOK(s):

1. A Sudhakar and Shyam Mohan SP - Circuits and Networks: Analysis and Synthesis, TMH, 2015.
2. William H. Hayt, Jack E. Kemmerly and Steven M. Durbin - Engineering Circuit Analysis, TMH, 2

REFERENCE BOOK(s):

1. M.E.Vanvalkenburg - Network Analysis, 3rd Edition, PHI, 2003
2. Franklin F.Kuo - Network Analysis and Synthesis, 2nd Edition, JohnWiley & Sons, 2003.
3. Ch. Alexander and M.N.O Sadiku - Fundamentals of Electrical Circuit, 5th Edition, TMH, 2013.

WEB RESOURCES:

http://nptel.iitm.ac.in/courses/

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Second Year B. Tech (SEMESTER – III)

ELEMENTS OF MECHANICAL ENGINEERING(18ME 001)

Course Category :		Course Type : Theory		
Lecture Hours: 4Hr.	Tutorial : 0Hr.	C I E: 50M	SEE : 50M	Credits : 3

CO1 Acquires the basic concepts of Professional ethics and human values & Students also gain the connotations of ethical theories.
CO2 Knows the duties and rights towards the society in an engineering profession
CO3 Would realize the importance and necessity of intellectual property rights.
CO4 Can take all the necessary precautions while conducting the experiments, which may reduce the risk.
CO5 Understands the importance of risk evacuation system in reality and takes the utmost responsibility while handling the risky situations.

UNIT – I

Metrology:
Standards of measurement: system of measurement, Imperial standard meter, line and end standards
Linear measurement: linear measurement Instrument, steel rule, calipers, surface plates, slip gauges
Comparators: Need of comparator, basic principle of operation, classification of comparators-sigma comparator & Pneumatic comparator.

Angular measurements: Instruments for Angular measurement: vernier bevel Bevel protractor, Universal bevel protractor, sine bar

UNIT – II

Power Transmission:
Drives: Belts, expression for the ratios of tensions on the slack and tight side, power Transmitted, V-belts, chain drives.
Gears: Spur, helical, Bevel gear trains – simple and compound.
Bearings: Purpose of bearings, slipper bearing, thrust bearing, ball and roller bearings.
Couplings: Flange, flexible couplings, hooks joint, universal coupling. (Qualitative treatment only)

UNIT – III

Thermodynamics:
Basic Concepts, equilibrium, Zeroth Law and First Law Of thermodynamics definitions and steady flow processes and applications, 2nd Law statements, reversibility, Carnot's Theorem, concept of entropy

UNIT – IV

Fluid mechanics:

Properties of Fluids, Fluid static, Hydrostatic Law, Manometers, Centre of pressure, force acting on plane surfaces, kinematics of fluids, types of flow , Continuity equation, equation of motion, Bernoulli's equation and applications

TEXT BOOKS:

1. M. Mahajan , A text book of Metrology, Dhanpat Rai & Co Publications
2. K.P Roy & SKH Choudary , Elements of mechanical Engineering-.
3. P.K.NAG Engineering Thermodynamics ,TMH
4. RK Bansal, Fluid Mechanics and Hydraulic Machines, 8th Ed, Lakshmi Pub.,

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Second Year B. Tech (SEMESTER – III)

PROFESSIONAL ETHICS AND HUMAN VALUES(18EI306)

Course Category :		Course Type : Theory		
Lecture Hours: 3Hr.	Tutorial : 0.	C I E: 50M	SEE : 50M	Credits :2

CO1 Acquires the basic concepts of Professional ethics and human values & Students also gain the connotations of ethical theories.

CO2 Knows the duties and rights towards the society in an engineering profession

CO3 Would realize the importance and necessity of intellectual property rights.

CO4 Can take all the necessary precautions while conducting the experiments, which may reduce the risk.

CO5 Understands the importance of risk evacuation system in reality and takes the utmost responsibility while handling the risky situations.

UNIT – I

Human Values: Morals, Values and Ethics, Integrity, Work Ethic, Service Learning, Civic Virtue, Respect for Others, Living Peacefully, caring, Sharing, honesty, Courage, Valuing Time, Co-operation, Commitment, Empathy, Self Confidence, Character, Spirituality.

UNIT – II

Engineering Ethics: Senses of 'Engineering Ethics', Variety of model issues, Types of inquiry, Moral dilemmas, Moral Autonomy, Kohlberg's theory, Gilligan's theory, Consensus and Controversy, Professions and Professionalism, Professional Ideals and Virtues, Theories about right action, Self-interest, customs and Religion, Uses of Ethical Theories.

UNIT – III

Engineering as Social Experimentation: Engineering as Experimentation, Engineers as responsible Experimenters, Codes of Ethics, A Balanced Outlook on Law.

Safety, Responsibility and Rights: Safety and Risk-Assessment of Safety and Risk , risk Benefit analysis and reducing risk.

Collegiality and Loyalty , Respect for Authority , Collective Bargaining - Confidentiality ,

aterials Management, Institution of electronics and telecommunication engineers (IETE), India, etc.

Text Books:

1. Mike Martin and Roland Schinzinger, Ethics in Engineering, McGraw Hill, New York 1996.
2. Govindarajan. M, Natarajan. S, Senthilkumar. V.S, Engineering Ethics, PHI, 2004.

Reference Books:

3. Charles D Fleddermann, Engineering Ethics, Prentice Hall, New Jersey, 2004
4. Charles E Harris, Michael S Pritchard and Michael J Rabins, Engineering Ethics Concepts and Cases, Thomson Learning, United States, 2000.
5. John R Boatright, Ethics and the Conduct of Business, PHI,New Delhi, 2003.

6. Edmund G Seebauer and Robert L Barry, Fundamentals of ethics for Scientists andConflicts of Interest , Occupational Crime , Professional Rights , employee Rights , Intellectual Property Rights (IIPR) , Discrimination.

UNIT – IV

Global Issues: Multinational Corporations , Environmental Ethics , Computer Ethics , Weapons Development , Engineers as Managers , consulting Engineering , Engineers as Expert Witnesses and Advisors, Moral Leadership,Sample Code of Ethics like ASME, ASCE, IEEE, Institution of engineers (India), Indian Institute of M
Engineers, Oxford University Press, 2001.

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Second Year B. Tech (SEMESTER – III)

ELECTRONIC DEVICESS Lab (18EIL31)

Lectures: 0	Tutorial: 0	Practical: 3	Self Study: 0
Continuous Internal Assessment: 50		Semester End Examination (3 Hours): 50	

CO-1 Calculate The Time Period And Frequency Of Signals And The Concept Of Depletion Layer And Cut-In Voltage.

CO-2 Understand The Active, Saturation And Cut-Off Regions And Calculate The Parameters Of Bjt, Fet And Ujt.

CO-3 Understand The Concept Of Ripple Factor, Efficiency, Regulation And Tuf Of Rectifiers.

LIST OF LAB EXPERIMENTS

1. Characteristics of Silicon and Germanium diodes.
2. Characteristics of Zener diode and its regulation characteristics.
3. Characteristics of BJT in Common Base configuration.
5. Characteristics of BJT in Common Emitter configuration.
6. Characteristics of Emitter follower circuit.
7. Output and Transfer Characteristics of JFET.
8. Characteristics of UJT.
9. Design and verification of self bias circuit for BJT.
10. Design and verification of collector to base bias circuit for BJT.
11. Design and verification of Fixed bias circuit for BJT.
12. Voltage Regulator using BJT.
13. Characteristics of SCR.
14. Study of CRO.
15. Characteristics of Triac.

NOTE: A minimum of 10 (Ten) experiments have to be performed and recorded by the candidate to attain eligibility for University Practical Examination.

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Second Year B. Tech (SEMESTER – III)

DIGITAL ELECTRONICS Lab(18 EIL 32)

Lectures: 0	Tutorial: 0	Practical: 3	Self Study: 0
Continuous Internal Assessment: 50		Semester End Examination (3 Hours): 50	

CO-1 Describe the numeric information indifferent bases, binary arithmetic's, various codes.

CO-2 Analyze various logic gates and logic families for the design of digital system.

CO-3 Design combinational and sequential logic circuits.

CO-4 Synthesize the fundamental concepts of state machines.

LIST OF LAB EXPERIMENTS

1. Realization of Gates using Discrete Components.
2. Realization of Gates using Universal Building Block (NAND only).
3. Design of Combinational Logic Circuits like Half-adder, Full-adder, Half Subtractor and Full-Sub tractor.
4. Verification of 4-bit Magnitude Comparator.
5. Design of Encoders like 4:2 and 8:3 encoder.
6. Design of Decoders like BCD – Decimal decoder.
7. Design of Code Converters (Binary to Gray).
8. Design of Multiplexers/De Multiplexers.
9. Verification of Truth Table of Flip-Flops using Gates.
10. Design of Shift register (To Verify Serial to parallel, parallel to Serial, Serial to Serial and parallel to parallel Converters) using Flip-Flops.
11. Design of Ring & Johnson Counters using Flip-Flops.
12. Conversion of Flip-Flops (JK-T, JK – D).
13. Design of Binary/Decade Counter.
14. Design of Asynchronous Counter, Mod Counter, Up Counter, Down Counter & Up/Down Counter.
15. Design of Synchronous Counter, Mod Counter, Up Counter, Down Counter & Up/Down Counter.

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Second Year B. Tech (SEMESTER – III)

NOTE: A minimum of 10 (Ten) experiments have to be performed and recorded by the candidate to attain eligibility for University Practical Examination.

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Second Year B. Tech (SEMESTER – III)

NETWORKS SIMULATION Lab(Code:**18 EIL 33**)

Lectures: 0	Tutorial: 0	Practical: 3	Self Study: 0
Continuous Internal Assessment: 50		Semester End Examination (3 Hours): 50	

CO-1 Apply basic network reduction techniques for analysis of electrical circuits.

CO-2 To learn the energy properties of electric elements and the techniques

CO-3 Apply Network Theorems for DC and AC Circuits.

CO-4 Analyze RL,RC,RLC circuits and understand response of circuits with excitations

LIST OF EXPERIMENTS:

1 PSPICE simulation of KCL & KVL

2 PSPICE simulation of nodal analysis for dc circuits.

3 PSPIC E simulation OF D.C. circuit for determining THEVININ'S equivalent

4 PSPICE simulation OF D.C. network with sub circuit

5 PSPICE simulation of transient and parametric analysis of series rl circuits using step and pulse input.

6 PSPICE simulation of transient and parametric analysis of series rc circuits using step and pulse input

7 PSPICE simulation of transient and parametric analysis of series rlc circuits using step and pulse input

8 PSPICE simulation of transient and parametric analysis of series rlc circuits using sine input

9 PSPICE simulation of millman's theorem for dc circuits

10 PSPICE simulation of maximum power transfer theorem for dc circuits

11 PSPICE simulation of reciprocity theorem for dc circuits

12 PSPICE simulation of superposition theorem for dc circuits

13 PSPICE simulation of ac circuits

14 PSPICE simulation of basic filters

15 PSPICE simulation of series resonance and parallel resonance

NOTE: A minimum of 10 (Ten) experiments have to be performed and recorded by the candidate to attain eligibility for University Practical Examination.

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Second Year B. Tech (SEMESTER – IV)

Complex Analysis and Special functions(18MA004)

(CSE/ECE & EIE)

Course Category:	Basic Sciences	**Credits:**	3
Course Type:	Theory	**Lecture - Tutorial -Practice:**	3- 0- 0
Prerequisites:	knowledge of Basic Mathematics	**Continuous Evaluation:** **Semester end Evaluation:** **Total Marks:**	50 M 50 M 100 M

Course Objective:

1. Understand the fundamental characteristics of the signal
2. Understanding similarity in representing the signal and vector spaces.
3. Understand the representation signal in time as well as frequency domain and interpret the signal and their frequency components.
4. Developing the mathematical skills to solve the problems in instrumentation engineering.
5. Understand effects of noise on signals.

Course outcomes

Upon successful completion of the course, the student will be able to:

CO1	Apply the knowledge of vectors and the orthogonality of vectors to the signals
CO2	Analyze the spectral characteristics of signals (continuous and discrete time as well as random signals)
CO3	Classify the systems and based on their properties.
CO4	Understand the process of sampling.
CO5	Study the effects of noise on the system and design systems that are susceptible to noise.

Course Content

UNIT – I

Complex Numbers and functions: Complex Numbers; Geometric Representation of Imaginary numbers; Roots of a complex number; Complex function; Real and imaginary parts of circular and hyperbolic functions; **Calculus of complex functions:** Introduction; Limit of a complex function; Derivative of f(z); Analytic functions; Harmonic functions; Complex integration; Cauchy's theorem; Cauchy's integral formula.

[Sections: 19.1; 19.2; 19.5; 19.7; 19.12; 20.1; 20.2; 20.3; 20.4; 20.5;20.12; 20.13; 20.14]

[12 Hours]

UNIT – II

Calculus of complex functions: Series of complex terms; Taylor series; Laurent's series; Zeros of an analytic function; Singularities of an analytic function; Residues; Residue theorem; Calculation of residues;

Evaluation of real definite integrals: Evaluation around the unit circle, Evaluation around a small semi-circle.

[Sections: 20.16.1; 20.16.2; 20.16.3; 20.17.1; 20.17.2; 20.18.1; 20.18.2; 20.19; 20.20]

[12 Hours]

UNIT – III

Fourier transforms: Introduction; Definition; Fourier integral theorem (without proof); Fourier sine and cosine integrals; Complex form of Fourier integrals; Fourier integral representation of a function; Fourier transforms ; Properties of Fourier transforms; Convolution theorem(without proof); Fourier transforms of the derivative of a function.

[Sections: 22.1; 22.2; 22.3.1; 22.3.3; 22.3.4; 22.4; 22.5; 22.6.2; 22.9]

[12 Hours]

UNIT – IV

Series Solution of Differential Equations and Special Functions: Introduction; Validity of series solution; Series solution when x = 0 is ordinary point of the equation; Frobenius method; Bessel's function; recurrence formula for $J_n(x)$; expansions for J_0 and J_1; value of $J_{1/2}$; generating function for $J_n(x)$; orthogonality of Bessel functions.

[Sections: 16.1;16.2;16.3;16.4;16.:,16.6;16.7;16.8;16.9;16.11]

[12 Hours]

Text Books

1. B.S.Grewal, "Higher Engineering Mathematics", 44thedition, Khanna publishers, 2017.

Reference Books

1. Erwin Kreyszig, "Advanced Engineering Mathematics", 9th edition, John Wiley & Sons.
2. N.P.Bali and M.Goyal, "A Text book of Engineering Mathematics", Laxmi publications,2010.

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Second Year B. Tech (SEMESTER – IV)

Electrical & Electronic Measurements (18EI402)

Course Category:	**Program Core**	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial -Practice:**	3- 1- 0
Prerequisites:	knowledge of Basic Circuits	**Continuous Evaluation:** **Semester End Evaluation:** **Total Marks:**	50 M 50 M 100 M

Course Objective:

1. Design DC Ammeters and Voltmeters using D' Arsonval Galvanometers.
2. Design different ac bridges for measurement of Capacitance,Inductance and Resistance.
3. Design of function generator to generate sine wave,triangular wave and square wave.
4. To understand the working of C.R.O and True RMS voltmeter and different harmonic analyzers.

Course outcomes

Upon successful completion of the course, the student will be able to:

CO1	Design DC Ammeters and Voltmeters using D' Arsonval Galvanometers.
CO2	Design different ac bridges for measurement of Capacitance,Inductance and Resistance.
CO3	Design of function generator to generate sine wave,triangular wave and square wave..
CO4	To understand the working of C.R.O and True RMS voltmeter and different harmonic analyzers.

COURSAE CONTENET

UNIT-I

Measurement and Error: Definitions, Accuracy and precision, significant figures, Types of errors,

Electro mechanical indicating instruments: Permanent magnet moving coil mechanism, DC Ammeter, DC Voltmeter, Voltmeter Sensitivity, Series type ohmmeter, Shunt type ohmmeter, calibration of DC instruments.

Alternating current indicating instruments:- AC&DC voltage Measurement: Thermoinstruments Power measurements: Electro dynamometers, Energy Measurement: WattHour meter, Powerfactor meters, Instrument Transformers: Current Transformer, Potential Transformer.

UNIT – II

Precision measurement of Component values(R,L,C):- Wheatstone

Bridge, Kelvin double bridge, Schering bridge, Maxwell's bridge, Hay's Bridge, Wein bridge, Wagner ground connection.

Electronic Instruments: AC Voltmeter using rectifiers, True RMS responding voltmeter, Electronic
Multimeter.

Digital voltmeters :– Ramp type DVM, Stair case ramp DVM, Dual slope DVM, Successive
approximation type DVM.

Vector Impedance meter, Q meter, RF power and voltage measurement: RF milli voltmeter.

UNIT- III

Cathode ray oscilloscope:- Oscilloscope: Block diagram, cathode ray tube: Electrical Deflection, screens of CRT, Graticules, CRT Circuits, Vertical deflection system: Blockdiagram, Attenuator. Horizontal deflection system: schematic of Triggered time base, Delay line: Distributed parameter Delay line.

Dual trace Oscilloscope.

Oscilloscope Techniques: Measurement of voltage, frequency and phase, pulse measurements, Oscilloscope probes: current probe with magnetic sensor, Hall effect sensor, Lissajous figures.

Special Oscilloscopes: -Block diagram of Digital storage oscilloscope.

UNIT- IV

Signal Generators & Analyzers:- Sine wave generator, Frequency – Synthesized signal generator,
Frequency divider generator, sweep frequency generator, Laboratory square wave and pulse
generator, Function generator

Wave analyzers:- Frequency Selective wave analyzer, Heterodyne wave analyzer, Applications.

Harmonic distortion analyzers:-Tuned circuit Harmonic Analyzer, Heterodyne Harmonic analyzer, Fundamental-suppression Harmonic Analyzer

Spectrum analyzers:- Fourier Transform spectrum analyzer.

Frequency Counters and Time interval Measurements:- Simple frequency counter: Its Applications Period measurement, Automatic and Computing Counters.

Text Books

1. W D Cooper & Albert D .Helfrick, Electronic Instrumentation and Measurement Techniques, PHI.
2.H.S.Kalsi,Elecdtronic Instrumentation ,TMH, Second Edition.

Reference Books:

1.A K Sawhney, Electrical and Electronic measurements and instrumentation, Dhanpat Rai.
2. David.A.Bell , Electronic Instrumentation and Measurements, PHI.

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Second Year B. Tech (SEMESTER – IV)

Signals and Systems (18EI403)

Course Category:	Program Core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial -Practice:**	4- 1- 0
Prerequisites:	Knowledge of differentiation and integrations and vector analysis	**Continuous Evaluation:** **Semester end Evaluation:** **Total Marks:**	50 M 50 M 100 M

Course Objective:

1. Understand the fundamental characteristics of the signal
2. Understanding similarity in representing the signal and vector spaces.
3. Understand the representation signal in time as well as frequency domain and interpret the signal and their frequency components.
4. Developing the mathematical skills to solve the problems in instrumentation engineering.
5. Understand effects of noise on signals.

Course outcomes

Upon successful completion of the course, the student will be able to:

CO1	Apply the knowledge of vectors and the orthogonality of vectors to the signals
CO2	Analyze the spectral characteristics of signals (continuous and discrete time as well as random signals)
CO3	Classify the systems and based on their properties.
CO4	Understand the process of sampling.
CO5	Study the effects of noise on the system and design systems that are susceptible to noise.

Course Content

UNIT – I

Introduction: Signals and systems defined types of signals, systems.

Mathematical description of Continuous–Time Signals: Functions and functional notation, signal functions, scaling and shifting, differentiation and integration, even and odd functions, periodic functions, signal energy and power.

Properties of Continuous –Time systems: Block diagram and system terminology, system modeling, system properties.

UNIT – II

Time-Domain Analysis of Continuous-Time Systems: The convolution integral, block diagram realization of differential equations.

The Continuous-Time Fourier Systems: Periodic excitation and response of LTI systems, Basic concepts and development of the Fourier series, Numerical computation of the Fourier series, convergence of the Fourier

series, properties of the Fourier series, band limited signals, responses of LTI systems with periodic excitation.

UNIT – III

The Continuous-Time Fourier Transform: Aperiodic excitation and response of LTI systems, Basic concepts and development of the Fourier transform, Convergence and the generalized Fourier transform, Numerical computation of the Fourier transform, Properties of the continuous time Fourier transform.

Continuous-Time Fourier Transform analysis of signals and systems: Frequency response, Ideal filters, Practical passive filters.

UNIT – IV

Sampling: Representing a continuous time signal by samples, Impulse sampling.

Correlation, Energy Spectral Density and Power Spectral Density: correlation and the correlogram,autocorrelation, cross correlation, correlations and the Fourier series, energy spectral density, power spectral density.

Text books and	1. Fundamentals of Signals and Systems, 2nd Edition, Michael J Roberts, Govind Sharma, Tata McGraw Hill, 2010.
Reference books	1. Signals and Systems, Simon Haykin, John Wiley, 2004. 2. Signals and Systems, A V Oppenheim, A S Wilsky& IT Young, PHI/ Pearson, 2003. 3. Signals, Systems and Communications, B P Lathi, BSP, 2003.
E-resources and other Digital material	https://nptel.lectures

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Effective From the Academic Year2018-2019(R18 Regulations)

Second Year B. Tech (SEMESTER – IV)

Analog Electronics (18EI404)

Course Category:	Program Core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial -Practice:**	4- 1- 0
Prerequisites:	Knowledge of circuit theory, Basics of Electronics	**Continuous Evaluation:** **Semester end Evaluation:** **Total Marks:**	50 M 50 M 100 M

Course Objective:

1. To understand Analysis of HWR and FWR with & without filter
2. Analyze Series and shunt regulated power supplies,3 terminal regulators (78XX and 79XX)
3. To understand Analysis of the BJT and FET Transistor at high frequency
4. Analyze various types of feedback amplifiers like voltage series, current series, current shunt and Voltage shunt..

Course outcomes

Upon successful completion of the course, the student will be able to:

CO1	Analysis of HWR and FWR with & without filter
CO2	Dsign power supplies,3 terminal regulators (78XX and 79XX)
CO3	Analysis of the BJT and FET Transistor at high frequency
CO4	Analyze various types of feedback amplifiers like voltage series, current series, current shunt and Voltage shunt.
CO5	Design power amplifiers and analyse its parameters

Course Content

Unit - I

POWER SUPPLIES: Rectifiers: Half–wave, Full–wave and bridge rectifiers, Efficiency, Ripple factor, Regulation, Harmonic components in rectified output, Types of filters: Choke input (inductor) filter, Shunt capacitor filters; Block diagram of regulated power supply, Series and shunt regulated power supplies, Three terminal regulators (78XX and 79XX),IC723.

Unit – II

TRANSISTOR AT HIGH FREQUENCY: Hybrid-pi CE transistor model, Hybrid-π Conductance, Hybrid-π Capacitances, Validity of Hybrid-π Model, Variation of Hybrid-π model, CE short circuit current gain

FET AT HIGH FREQUENCY: FET small signal model, CS / CD configurations at high frequencies.

UNIT – III

FEEDBACK AMPLIFIERS: Classification of amplifiers, Feedback concept,

Transfer Gain with Feedback, Negative feedback amplifiers and their characteristics, Input &Output resistance, Method of Analysis of a feedback amplifier, Voltage-series Feedback, Current- series Feedback, Current-shunt Feedback ,Voltage-shunt Feedback amplifier

UNIT – IV

POWER AMPLIFIERS: Class A Large-signal amplifier, Second-harmonic Distortion, Higher order Harmonic Distortion, Transformer Coupled Audio Power Amplifier, Efficiency, Push Pull Amplifiers Class B Amplifier ,Class AB Operation.

WAVE SHAPING CIRCUITS: Diode clippers, clampers, The high- pass RC circuit, The low-pass RC circuit

Test Books:

1. Electronic Devices and Circuits , S.Salivahanan & N. Suresh Kumar ,3rd Edition Mc Graw Hill Education (India) Pvt Ltd.
2. Electronic Devices and Circuit Theory", Robert L. Boylestad and Louis Nashelsky
3. Microelectronics: Circuit Analysis and Desigm, Donald A. Neamen, 4th Edition, Tata Mc-Graw Hill,

Reference Books:

1. Microelectronic Circuits, 7th Edition, Sedra & Smith, Oxford University Pres
2. Electronics- Jacob Millman, Chritos C. Halkies, Tata Mc-Graw Hill

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Second Year B. Tech (SEMESTER – IV)

Technical English(18EL002)

Course Category:	Humanities	**Credits:**	2
Course Type:	Theory	**Lecture - Tutorial -Practice:**	3- 0- 0
Prerequisites:	**Basic Communication Skills**	**Continuous Evaluation:** **Semester end Evaluation:** **Total Marks:**	50 M 50 M 100 M

Course outcomes

Upon successful completion of the course, the student will be able to:

CO1	Read, write and aptly understand what ever is written and spoken in English
CO2	Speak fluently with acceptable pronunciation and write using appropriate words, spellings, grammar and syntax
CO3	Read the lines, between lines and beyond lines excelling in comprehension skills
CO4	Draft Reports, memos, mails & letters as part of their work
CO5	Speak grammatically error free English

Course Content

UNIT-I

1.1 Vocabulary Development: Familiarising Idioms & Phrases
1.2 Grammar for Academic Writing: Making Requests
1.3 Language Development: Using Transition & Link words
1.4 Technical Writing: Letter Writing & Email Writing

UNIT-II

2.1 Vocabulary Development: Analogous words
2.2 Grammar for Academic Writing: Tenses: Simple Past /Present Perfect, The Future: Predicting & Proposing
2.3 Language Development: Cloze tests
2.4 Technical Writing: Technical Reports

UNIT-III

3.1 Vocabulary Development: Abbreviations& Acronyms
3.2 Grammar for Academic Writing: Describing(People/Things/Circumstances) : Adjectival & Adverbial groups
3.3 Language Development: Transcoding (Channel convertion from chart to text)
3.4 Technical Writing: Circular, Memos, Minutes of Meeting

UNIT-IV

4.1 Vocabulary Development: Corporate vocabulary

4.2 Grammar for Academic Writing: Inversions & Emphasis
4.3 Language Development: Reading Comprehension
4.4 Technical Writing: Resume Preparation

Text books

- Communication Skills, Sanjay Kumar & Pushpa Latha. Oxford University Press:2011.
- Technical Communciation Principles and Practice. Oxfor University Press:2014.
- Advanced Language Practice, Michael Vince. MacMilan Publishers:2003.
- Objective English(Third Edition), Edgar Thorpe & Showick. Pearson Education:2009.

English Grammar: A University Course (Second Edition), Angela Downing & Philip Locke, Routledge Taylor & Francis Group: 2016

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Second Year B. Tech (SEMESTER – IV)

BIOLOGY FOR ENGINEERS (18CE002)

Course Category:	Humanities	**Credits:**	2
Course Type:	Theory	**Lecture - Tutorial -Practice:**	3- 0- 0
Prerequisites:	--	**Continuous Evaluation:** **Semester end Evaluation:** **Total Marks:**	50 M 50 M 100 M

Course outcomes

Upon successful completion of the course, the student will be able to:

CO1	Graduates within the first five years will be able to grasp and apply biological engineering principles, procedures needed to solve real-world problems
CO2	To understand the fundamentals of living things, their classification, cell structure and biochemical constituents
CO3	To apply the concept of plant, animal and microbial systems and growth in real life situations
CO4	To know the cause, symptoms, diagnosis and treatment of common diseases CO6
CO5	To give a basic knowledge of the applications of biological systems in relevant industries

Course Content

UNIT-I

Introduction to biology; Classification of microorganisms- Two kingdom, Three kingdom & Five kingdom; Prokaryotic cell structure (Bacteria); Eukaryotic cell structure (Plant & Animal cells); Differences between Prokaryotes and Eukaryotes.

UNIT-II

Bacterial Growth Phases; Nutrition in Bacteria; Types of media; Bacteria - Binary Fission, Endospore Formation; Plant & Animal cell Division - Mitosis & Meiosis.

UNIT-III

Structure of DNA (Watson & Crick model); Types of DNA & Function of DNA; Structure of RNA & types of RNA; Differences between DNA & RNA. Types of proteins & structure of proteins.

UNIT-IV

Sterilization methods - Physical methods : Heat, Filtration, radiation; Chemical methods: Phenolics, alcohols, aldehydes, halogens, heavy

metals, sterilizing gases, dyes. Economic importance of bacteria (Harmful & Beneficial aspects); Plants in Primary Health care - Tulasi, piper longum, Myrobalan, Aloe vera, Turmeric.

Reference Books

1. Prof. K.yadagiri., Dr. M. Manikya Lakshmi, "Botany" paper-I,II,III,IV (Telugu Akademi Coordinating Committee)
2. Presscott, "Microbiology"
3. Pelczar, "Microbiology"
4. Ananthanarayana, "Microbiology"

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Effective From the Academic Year2018-2019(R18 Regulations)

Second Year B. Tech (SEMESTER – IV)

MEASUREMENTS LAB (18EIL41)

Course Category:	Program Core	**Credits:**	1
Course Type:	Practical	**Lecture - Tutorial -Practice:**	0- 0- 3
Prerequisites:	--	**Continuous Evaluation:** **Semester end Evaluation:** **Total Marks:**	50 M 50 M 100 M

Course outcomes

CO1 To understand Analysis of HWR and FWR with & without filter
CO2 Able to design both small signal and large signal amplifiers
CO3 Can understand the feed back amplifier and RC coupled amplifiers
CO4 Able to design any type of nonlinear wave shaping circuits

List of Experiments

1. DC meters using D' Arsonval Galvanometers
2. AC meters using D' Arsonval Galvanometers
3. Measurement of resistance using Kelvin Double Bridge
4. Measurement of inductance using Maxwell Bridge
5. Measurement of capacitance using Shearing and DeSauty's Bridge
6. Design and Development of Regulated Current Source
7. Study of spectrum analyzer
8. Study of Wave Analyzer
9. Study of Harmonic distortion Analyzer
10. Study of Q meter
11. Measurement of RF power and Voltage
12. Study of Function generator
13. Study of True RMS voltmeters
14. Study of vector impedance meter
15. Design of ohmmeter.

NOTE: A minimum of 10(Ten) experiments, choosing 5 (Five) from each part, have to be performed and recorded by the candidate to attain eligibility for University Practical Examination.

SIGNALS and SYSTEMS LAB (18EIL42)

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Electronics and Instrumentation Engineering

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Second Year B. Tech (SEMESTER – IV)

Course Category:	Program Core	**Credits:**	1
Course Type:	Practical	**Lecture - Tutorial -Practice:**	0- 0- 3
Prerequisites:	**Basics of mathematics & programming**	**Continuous Evaluation:** **Semester end Evaluation:** **Total Marks:**	50 M 50 M 100 M

Course Objective:

Course outcomes

Upon successful completion of the course, the student will be able to:

CO1	Perform basic mathematical operations on basic signals and classifying the systems
CO2	Analyze the LTI system, Can evaluate systems response and Represent a continuous time periodic signal as a Fourier series and determine response of the LTI system to any input signal
CO3	Use the Fourier transform to analyze continuous time signals and systems
CO4	Perform sampling of low pass signals; verify correlation and computation of spectral densities.

List of Experiments

1. Basic Operations on Matrices.
2. Generation of basic continuous time signals namely unit impulse, step, ramp, exponential and Sinusoidal signals.
3. Generation of basic discrete time signals namely unit impulse, step, ramp, exponential and Sinusoidal signals.
4. Operations on Signals and Sequences such as Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average Power.
5. Finding the Even and Odd Parts of Signal or Sequence and Real and Imaginary Parts of Signal.
6. Verification of linearity and time invariance properties of a given continuous /discrete system.
7. Convolution between Signals and Sequences.
8. Autocorrelation and Cross correlation between Signals and Sequences.
9. Verification of Linearity and Time Invariance Properties of a Given Continuous/Discrete system.
10. Computation of Unit Sample, Unit Step and Sinusoidal Responses of the Given LTI System and Verifying its Physical Realizability and Stability Properties.
11. Finding the Trigonometric Fourier Series of a given Signal.
12. Finding the Fourier Transform of a given Signal and plotting its Magnitude and Phase spectrum.
13. Sampling Theorem Verification.
14. Program to find frequency response of analog LP/HP/BP/BS filters.
15. Program to find the impulse response of a system defined by a

difference equation.

NOTE: A minimum of 10 (Ten) Programs have to be performed and recorded by the candidate to attain eligibility for Semester End Examination.

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Electronics and Instrumentation Engineering

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Second Year B. Tech (SEMESTER – IV)

ANALOG ELECTRONICS LAB (18EIL43)

Course Category:	Program Core	**Credits:**	1
Course Type:	Practical	**Lecture - Tutorial -Practice:**	0- 0- 3
Prerequisites:	**--**	**Continuous Evaluation:** **Semester end Evaluation:** **Total Marks:**	50 M 50 M 100 M

Course outcomes

Upon successful completion of the course, the student will be able to:

CO1 To understand Analysis of HWR and FWR with & without filter
CO2 Able to design both small signal and large signal amplifiers
CO3 Can understand the feed back amplifier and RC coupled amplifiers
CO4 Able to design any type of nonlinear wave shaping circuits

List of Experiments

1. Low pass and High pass Filter characteristics
2. Half–Wave with and without filter
3. Full-Wave Rectifier with and without filter
4. Frequency Response of CE Amplifier
5. Frequency Response of CS Amplifier
6. Verification of Clippers
7. Verification of Clampers
8. Design and Verification of Class-A Power Amplifier
9. Design and Verification of Voltage Regulator
10. Design and Verification of Voltage shunt feedback amplifier
11. Design and Verification of Class B push pull amplifier
12. Verify 78xx and 79xx Voltage regulators
13. Design and Verification of Differential amplifier
14. Design and Verification of RC coupled amplifier

NOTE: A minimum of 10 (Ten) programs are to be executed and recorded to attain eligibility for Semester End Examination.

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Third Year B. Tech (SEMESTER – V)

CONTROL SYSTEMS (18EI501)

Lectures: 4	**Tutorial: 1**	**Practical: 0**	**Self Study:0**	**Credits :4**
Continuous Internal Assessment: 50		**Semester End Examination (3 Hours): 50**		

Course Objectives:

- Identify the basic elements of open loop and closed loop control systems & also derive systems input output relations using differential equation (from physical systems), Block diagram reduction & signal-flow graphs techniques.
- Analyze the response of a system in Time Domain with various test signals.
- Evaluate the quantitative response of a system in Frequency Domain with test Stimuli.
- Analyze and characterize the stability of system by RHC, Root Locus, Bode Plot, Polar Plot and State Space Model for LTI systems .etc.

Course Outcomes :

CO1: Able to apply Laplace transform and state space techniques to model dynamic systems.

CO2: Able to understand of the fundamentals of control systems.

CO3: Able to determine the time domain responses of first and second-order systems.

CO4: Able to analyze the system behaviour in frequency domain and able to manipulate the system stability using compensator.

Syllabus :

UNIT – I

Introduction: Basic concept of simple control system, open loop – closed loop control systems. Effect of feedback on overall gain – stability , sensitivity and external noise. Types of feed back control systems – Liner time invariant, time variant systems and non linear control systems.

Mathematical models and Transfer functions of Physical systems: Differential equations – impulse response and transfer functions – translational and rotational mechanical systems. Transfer functions and open loop and closed loop systems. Block diagram representation of control systems – black diagram algebra – signal flow graph – Mason's gain formula Components of Control Systems: DC servo motor – AC servo motor – synchro transmitter & receiver.

UNIT – II

Time domain analysis: Standard test signals – step, ramp, parabolic and impulse response function – characteristic polynomial and characteristic equations of feed back systems – transient response of first order and second order systems to standard test signals. Time domain specifications – steady state response – steady state error and error constants. Effect of adding poles and zeros on over shoot, rise time, band width – dominant poles of transfer functions.

Stability Analysis in the complex plane: Absolute, relative, conditional, bounded input – bounded out put, zero input stability, conditions for stability, Routh –

Hurwitz criterion.

UNIT – III

Frequency domain analysis: Introduction – correlation between time and frequency responses – polar plots – Bode plots – Nyquist stability criterion – Nyquist plots. Assessment of relative stability using Nyquist criterion – closed loop frequency response.

UNIT – IV

Root locus Technique: Introduction – construction of root loci State space analysis: Concepts of stat, state variables and state models – digitalization – solution of state equations – state models for LTI systems. Concepts of controllability and Observability.

Text Books:

1. B.C. Kuo, Automatic control systems, 7th edition, PHI.
2. I.J.Nagrath & M Gopal, Control Systems Engineering, 3rd edition, New Age International.
3. K. Ogata, Modern Control Engineering, 3rd edition, PHI.

Reference Books:

1. Schaum Series, Feedback and Control Systems, TMH
2. M.Gopal, Control Systems Principles and Design, TMH
3. John Van de Vegta, Feedback Control Systems, 3rd edition, Prentice Hall,1993.

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Third Year B. Tech (SEMESTER – V)

TRANSDUCERS (18EI502)

Lectures: 4	**Tutorial: 1**	**Practical: 0**	**Self Study:0**	**Credits :4**
Continuous Internal Assessment: 50		**Semester End Examination (3 Hours): 50**		

Course Objectives:

- To deal with various types of Sensors & Transducers and their working principle.
- To deal with Resistive, Capacitive and Inductive transducers.
- To deal with some of the miscellaneous transducers.
- To know the overview of different advanced sensors.

Course Outcomes :

CO1: Analyze the various performance characteristics of instrument and the quality of measurement.

CO2: Identify the type of transducer based on the transduction principles.

CO3: Select the relevant transducer for measurement of physical quantities to meet the requirements of industrial applications.

CO4: Identify the additional attributes in advanced sensors.

Syllabus :

UNIT- I

Introduction: Basic definitions related to measurements/ Instrumentation, Block diagram of generalized measurement / Instrumentation system.

Static characteristics of instruments: Introduction, static characteristics: accuracy, precision, resolution, static sensitivity, Linearity, Threshold, Hysteresis, Dead Zone, span, Range Loading effect.

Errors in Measurements: Static error, Types of errors, estimation of static errors: limiting errors & their combinations, error estimates from the normal distribution, probable errors& their combinations statistical analysis of measurement data uncertainty analysis curve fitting: Method of least squares.

Dynamic characteristics: Generalized Mathematical model of measurement system, operational & sinusoidal transfer functions zero, first and second order instruments & their response to step, ramp, and impulse inputs.

UNIT- II

Introduction: Definition of Transducer, Classification of transducers.

Resistive Transducers: Potentiometers, Strain gauges & their types, RTDs, Thermistors, Hotwire anemometers.

Inductive Transducers: Principles of Inductive transducers: Change in self inductance, Change in mutual inductance, Production of eddy currents, Variable reluctance transducer, Linear Variable differential transformer (LVDT), Rotary Variable differential transformer (RVDT), Magneto strictive transducer.

UNIT- III

Capacitive Transducers: Variable dielectric, Variable gap, Variable area type Capacitive devices, Differential type.

Piezo-electric Transducers: Piezo-electric effect, Piezo-electric Materials, Piezo-electric transducer & its characteristics

UNIT- IV

Developments in Sensor Technology: Introduction, Smart sensors, Micro Sensors, IR radiation Sensors, Ultrasonic Sensors, Fiber optic sensors, Chemical sensors and Bio Sensors.

Text Books:

[1] A.K.Ghosh, "Introduction to Measurements & Instrumentation", IIIrd ed, PHI, 2009. (UNIT I)

[2] A.K.Sawhney & Puneet Sawhney, "A Course in Mechnanical Measuremnets & Instrumentation", XIIth ed, Dhanapat Rai & Co., 2012. (UNIT II & III)

[3] D.V.S.Murty, "Transducers & Instrumentation", IIed, PHI. (UNIT IV)

Reference Books:

[1] Raman Pallas-Arney & John G.Webster, "Sensors & Signal Conditioning", II nd ed., J. Wiley,2012.

[2] D.Patranabis, "Sensors and Transducers" II nd ed., PHI, 2013.

[3] BC Nakra, KK Chaudhry "Instrumentation, Measurement and Analysis", IIed TMH.

E-resources and other:

[1] http://nptel.ac.in/courses/112103174/4

[2] http://nptel.ac.in/courses/112103174/3

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Third Year B. Tech (SEMESTER – V)

ANALOG ELECTRONIC CIRCCUITS - II (18EI503)

Lectures: 4	Tutorial: 1	Practical: 0	Self Study:0	Credits :4
Continuous Internal Assessment: 50		Semester End Examination (3 Hours): 50		

Course Objectives:

- To understand the basic operation &performance parameters ofoperational amplifiers.
- To learn the linear and non-linear applications of operational amplifiers
- To Asses non-linear wave shaping of op-amp and Compare different types of data converters
- To understand the analysis & design of different types of active filters using op amps and to learn the internal structure, operation and applications of different analog ICs

Course Outcomes :

CO1: Determine the effect of feedback on op-amp and Infer the DC and AC characteristics of operational amplifiers and its effect on output,compensation techniques and its applications.

CO2: Design simple circuits using OP-AMP for linear and nonlinear applications.

CO3: Analyze the non-linear wave shaping of op-amp and Compare different types of data converters.

CO4: Illustrate the function of special ICs such as 555 timer Voltage regulators, PLL ,Active filters and its application in communication.

Syllabus :

UNIT – I

OPERATIONAL AMPLIFIERS: Block diagram of Operational Amplifier, Ideal voltage Amplifiers, Negative feedback concept in Op Amps, Bandwidth Limitations, cascaded Op-Amps, Op-Amp Error sources, Frequency compensation and stability, slew rate.

OP-AMP APPLICATIONS: The summing Amplifier, Differential and Instrumentation Amplifiers, voltage to current and current to voltage conversion, The Op Amp with complex Impedances,Differentiators and Integrators, Non Linear Op Amp circuits, Precision Rectifiers.

UNIT – II

OSCILLATORS: Oscillator Principles, Oscillator types, Frequency stability, phase shift oscillator, Wein bridge oscillator, Quadrature oscillator, Square-wave Generator, Triangular wave Generator, saw tooth wave Generator, Voltage controlled oscillator.

COMPARATORS: Introduction to comparator, Basic comparator, zero-crossing detector, Schmitt Trigger, comparator characteristics, Limitations of Op-Amps as

comparators, voltage limiters, High speed and precision type comparators, window detector,

UNIT – III

CLIPPERS, CLAMPERS & CONVERTERS: Positive and Negative Clippers, Positive and Negative Clampers, Absolute value output circuit, peak detector, Sample and Hold Circuit

D/A & A/D CONVERTERS-Fundamentals, weighted resistor summing D/A Converter, R-2R Ladder D/A converter ,Ramp converters, Successive Approximation A/D converters, Dual slope converters, parallel A/D converters. Tracking A/D converters.

UNIT – IV

APPLICATIONS OF SPECIAL ICs: The 555 timer, 555 as Monostable and AstableMultivibrator and its applications. Phase Locked loops, operating principles, Monolithic PLLs, 565 PLL Applications. AD623 Instrumentation Amplifier, AD633 Analog multiplier ICs.

ACTIVE FILTERS: Active LP and HP filters, Sallen key LP and HP filters, Band pass filters – Wideband, Band pass and multiple feedback Band pass filters, Band stop filters, state variable filters, All pass filters.

Text Books:

1. D. Roy Chowdhary, Principles of Integrated Circuits, 2nd Edition., New Age International, 2003.
2.Rama Kant A. Gayakwad, Op-Amps and Linear Integrated Circuits, 3rd Ed., PHI, 1997,
3. Denton J Dailey, Operational Amplifiers and Linear Integrated Circuits: Theory and
Applications, Mc GH, 1989.

Reference Books:

1. V.K. Aatre, Network Theory and Filter Design, 2nd Edition., New Age International, 1997.
2. Jacob, Applications and Design with Analog Integrated Circuits, 2nd Edition, PHI, 1996.
3. Operational Amplifiers & Linear Integrated Circuits–R.F.Coughlin& Fredrick Driscoll, PHI, 6th Edition.
4. Operational Amplifiers & Linear ICs – David A Bell, Oxford Uni. Press, 3rd Edition

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Third Year B. Tech (SEMESTER – V)

MICROCONTROLLERS (18EI504)

Lectures: 4	**Tutorial: 1**	**Practical: 0**	**Self Study:0**	**Credits :4**
Continuous Internal Assessment: 50		**Semester End Examination (3 Hours): 50**		

Course Objectives:

- To understand the concept of microcontroller based system
- To enable design and programming of microcontroller (8051)based system.
- To know about the interfacing circuits.
- To enable design and programming of PIC microcontroller based system.

Course Outcomes :

CO1: The student can gain good knowledge on microcontroller and implement in practical application.

CO2: Learn interfacing of Microcontroller.

CO3: Get familiar with real time PIC microcontroller based system

CO4: design and programming of PIC microcontroller based system.

Syllabus :

UNIT-1

(15 Hrs)

Introduction: Comparison of microprocessor and microcontroller, evolution of microcontrollers from 4 bit to 32 bit, development tools for microcontrollers, Assembler-Compiler- simulator/ Debugger.

Microcontroller Architecture: Over view and block diagram of 8051,Architecture of 8051, memory organization, , PSW registers, register banks, and stack, pin diagram of 8051, port organization, Interrupts and timers, Addressing modes.

UNIT-II

(15 Hrs) :

Instruction set of 8051: Arithmetic, Logical, Simple bit, jump, loop and call instructions and their usage. Time delay generation and calculation, Timer/ Counter programming.

Assembly language programming: Data types and directives ,Addition, Multiplication, Subtraction, division, finding from a given set of numbers, arranging given set of numbers in ascending / descending order.

UNIT-III

(15 Hrs)

Interfacing and application of Microcontroller: Interfacing of PPI 8255, Temperature measurement (LM35). Interfacing and application of Microcontroller: DAC (0804), interfacing seven segment displays, displaying information on a LCD, control of a stepper motor (Uni – polar), Interfacing a 4 X 3 matrix Keypad, Generation of different types of waveforms using DAC.

UNIT- IV

(15 Hrs)

PIC 16F8XX Flash Microcontrollers : Introduction,pin diagram of

16F8XX,Registers –STATUS,OPTION_REG,PCON,Program Memory,Data Memory,Interrupts,I/O ports,Timers,Capture/compare/PWM Modules in PIC16F877,MSSP Module,USART,ADC.

Text Books:

1. The 8051 microcontroller and embedded systems By Muhammad Ali Maxzali and Janice Gillispe MazaDi – Pearson edition Asis, 4th Reprint 2002.
2. Microcontroller theory and application by Ajay V.Deshmukh.

Reference Books:

1. The 8051 Microcontroller Architecture, programming and applications by Kenneth J.Ayala, West publishing company .
2. Microcontrollers Architecture programming, Interfacing and systems design by Ral kamal
3. Douglas V. Hall, Microprocessors and interfacing: programming and hardware, Tata
McGraw Hill, 2editon, 2007.

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Third Year B. Tech (SEMESTER – V)

ANALOG AND DIGITAL COMMUNICATIONS (18EID11)

Lectures: 3	**Tutorial: 1**	**Practical: 0**	**Self Study:0**	**Credits :3**
Continuous Internal Assessment: 50		**Semester End Examination (3 Hours): 50**		

Course Objectives:

- Understand analog and digital communication techniques.
- Learn data and pulse communication techniques.
- Be familiarized with source and Error control coding.
- Gain knowledge on multi-user radio communication.

Course Outcomes :

CO1: Apply analog and digital communication techniques.
CO2: Use pulse communication techniques.
CO3: Analyze Source and Error control coding.
CO4: Utilize multi-user radio communication.

Syllabus :

UNIT I

ANALOG COMMUNICATION (15P)

Introduction to Communication Systems: Modulation – Types – Need for Modulation. Theory of Amplitude Modulation – Evolution and Description of SSB Techniques – Theory of Frequency and Phase Modulation – Comparison of various Analog Communication System (AM – FM – PM).

UNIT II

PULSE COMMUNICATION (15P)

Pulse Communication: Pulse Amplitude Modulation (PAM) – Pulse Time Modulation (PTM) – Pulse code Modulation (PCM) – Comparison of various Pulse Communication System (PAM – PTM – PCM). Noise: Source of Noise – External Noise- Internal Noise- Noise Calculation.

UNIT III

DIGITAL COMMUNICATION(15P)

Amplitude Shift Keying (ASK) – Frequency Shift Keying (FSK) Minimum Shift Keying (MSK) –Phase Shift Keying (PSK) – BPSK – QPSK – 8 PSK – 16 PSK – Quadrature Amplitude Modulation (QAM) – 8 QAM – 16 QAM – Bandwidth Efficiency– Comparison of various Digital Communication System (ASK – FSK – PSK – QAM).

UNIT IV

SOURCE AND ERROR CONTROL CODING(8P)

Entropy, Source encoding theorem, Shannon fano coding, Huffman coding, mutual information, channel capacity, channel coding theorem, Error Control Coding, linear block codes, cyclic codes, convolution codes, viterbi decoding algorithm.

MULTI-USER RADIO COMMUNICATION(7P)

Advanced Mobile Phone System (AMPS) – Global System for Mobile Communications (GSM) – Code division multiple access (CDMA) – Cellular Concept and Frequency Reuse – Channel Assignment and Hand – Overview of Multiple Access Schemes – Satellite Communication – Bluetooth.

Text Books:

1. B. P.Lathi, "Modern Analog and Digital Communication Systems", 3rd Edition, Oxford University Press, 2007
2. Wayne Tomasi, "Advanced Electronic Communication Systems", 6th Edition, Pearson Education, 2009.

Reference Books:

1. Simon Haykin, "Communication Systems", 4th Edition, John Wiley & Sons, 2004
2. Rappaport T.S, "Wireless Communications: Principles and Practice", 2nd Edition, Pearson Education, 2007
3. H.Taub, D L Schilling and G Saha, "Principles of Communication", 3rd Edition, Pearson Education, 2007.
4. B. P.Lathi, "Modern Analog and Digital Communication Systems", 3rd Edition, Oxford University Press, 2007.

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Third Year B. Tech (SEMESTER – V)

COMPUTER ORGANIZATION(18EID12)

Lectures: 3	**Tutorial: 1**	**Practical: 0**	**Self Study:0**	**Credits :3**
Continuous Internal Assessment: 50		**Semester End Examination (3 Hours): 50**		

Course Objectives:

- Identify the CPU micro operations and instruction set of a digital computer
- Design of a control unit using micro programmed control and hardwired control approaches and explore the basic concepts of CPU including STACK,Instruction formats and addressing modes.
- Analyze parallel processing using pipelining and vector processing techniques and perform arithmetic operations on fixed and floating point numbers.
- Analyze the memory hierarchy system,communication methods of I/O devices and standard I/O interfaces.

Course Outcomes :

CO1: Learn the CPU micro operations and instruction set of a digital computer

CO2: Design of a control unit using micro programmed control and hardwired control approaches and explore the basic concepts of CPU including STACK, Instruction formats and addressing modes.

CO3: Learn parallel processing using pipelining and vector processing techniques and perform arithmetic operations on fixed and floating point numbers.

CO4: Design the memory hierarchy system, communication methods of I/O devices and standard I/O interfaces.

Syllabus :

UNIT I

BASIC STRUCTURE OF COMPUTERS

Functional units – Basic operational concepts – Bus structures – Performance and metrics – Instructions andinstruction sequencing – Hardware – Software Interface – Instruction set architecture – Addressing modes – RISC – CISC. ALU design – Fixed point and floating point operations.

UNIT II

BASIC PROCESSING UNIT

Fundamental concepts – Execution of a complete instruction – Multiple bus organization – Hardwired control – Micro programmed control – Nano programming.

UNIT III

PIPELINING

Basic concepts – Data hazards – Instruction hazards – Influence on instruction sets – Data path and control considerations – Performance considerations – Exception handling.

UNIT IV

MEMORY SYSTEM

Basic concepts – Semiconductor RAM – ROM – Speed – Size and cost – Cache memories – Improving cache performance – Virtual memory – Memory management requirements – Associative memories – Secondary storage devices. I/O ORGANIZATION -Accessing I/O devices – Programmed Input/Output - Interrupts – Direct Memory Access – Buses – Interface circuits – Standard I/O Interfaces (PCI, SCSI, USB), I/O devices and processors.

Text Books:

1. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, "Computer Organization", Fifth Edition, Tata McGraw Hill, 2002.

Reference Books:

1.David A. Patterson and John L. Hennessy, "Computer Organization and Design: The Hardware/Software interface", Third Edition, Elsevier, 2005.
2.William Stallings, "Computer Organization and Architecture – Designing for Performance", Sixth Edition, Pearson Education, 200UNIT III
3.John P. Hayes, "Computer Architecture and Organization", Third Edition, Tata McGraw Hill, 1998.
4.V.P. Heuring, H.F. Jordan, "Computer Systems Design and Architecture", Second Edition, Pearson Education, 2004.

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Third Year B. Tech (SEMESTER – V)

INTELLIGENT SENSORS AND INSTRUMENTATION (18EID13)

Lectures: 3	**Tutorial: 1**	**Practical: 0**	**Self Study:0**	**Credits :3**
Continuous Internal Assessment: 50		**Semester End Examination (3 Hours): 50**		

Course Objectives:

- To understand the design methodologies for measurement and instrumentation of real world problems.
- To be study the concepts of intelligent sensor devices, their performance characteristics and signal and system dynamics.
- To address the issues in dealing signal conditioning operations such as calibration, linearization and compensation.
- To use artificial intelligence in sensor signal processing to solve real world problems and to deal with interfacing protocols in wireless networking platform.

Course Outcomes :

CO1: To develop the design methodologies for measurement and instrumentation of real world problems.

CO2: To learnthe concepts of intelligent sensor devices, their performance characteristicsand signal and system dynamics.

CO3: To cultivate he issues in dealing signal conditioning operations such as calibration, linearization and compensation.

CO4: To use artificial intelligence in sensor signal processing to solve real world problems and to deal with interfacing protocols in wireless networking platform.

Syllabus :

UNIT - I

INTRODUCTION: intelligent instrumentation, definition, types of instruments, static and dynamic characteristics of instruments, Historical Perspective, Current status, software based instruments.

INTELLIGENT SENSORS: Classification, Smart sensors , Monolithic Integrated Smart Sensors,Hybrid Integrated Smart Sensors, Cogent Sensors, Soft or Virtual sensors, self-adaptive, self-validating sensors, Soft Sensor Secondary Variable Selection, Rough Set Theory , Model Structures.

SelfAdaptive Sensors, Self-Validating Sensors, VLSI Sensors,Temperature Compensating Intelligent Sensors, Pressure Sensor

UNIT-II

LINEARIZATION, CALIBRATION, AND COMPENSATION: Analog Linearization of Positive and Negative Coefficient Resistive Sensors.Higher-Order Linearization , Quadratic Linearization , Third-Order Linearization Circuit,

Nonlinear ADC- and Amplifier-Based Linearization, Interpolation, Piecewise Linearization, Artificial Neural Network– Based Linearization, NonlinearAdaptive Filter–Based Linearization, Sensor Calibration, Conventional Calibration Circuits ,Offset Compensation, Error and Drift Compensation, Lead Wire Compensation.

UNIT-III

SENSORS WITH ARTIFICIAL INTELLIGENCE:Artificial Intelligence, Sensors with Artificial Intelligence, Multidimensional Intelligent Sensors,AI for Prognostic Instrumentation, ANN-Based Intelligent Sensors, Fuzzy Logic–based intelligent sensors

UNIT-IV

INTELLIGENT SENSOR STANDARDS AND PROTOCOLS: IEEE 1451 Standard, STIM, TEDS, NCAP, Network Technologies, LonTalk, CEBUS, J1850Bus, 1 Signal Logic and Format, MI Bus, Plug-n-Play Smart Sensor Protocol

Text Books:

1. ManabendraBhuyan, ―Intelligent Instrumentation: Principles and Applications‖ CRC Press,2011.
2. G. C. Barney, ―Intelligent Instrumentation‖, Prentice Hall, 1995.

Reference Books:

1. J.B DIXIT, A. yadavLaxmi Publications, Ltd., 01-Sep-2011
2. A.S. Moris / Principles of Measurement & Instrumentation / Prentice Hall, 1993.

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Third Year B. Tech (SEMESTER – V)

TELEMETRY AND SCADA (18EID14)

Lectures: 3	Tutorial: 1	Practical: 0	Self Study:0	Credits :3
Continuous Internal Assessment: 50		Semester End Examination (3 Hours): 50		

Course Objectives:

- To give Knowledge of functions of telemetry system
- To know various methods in land telemetry and radio telemetry
- To know Data Acquisition system, SCADA system components and SCADA architecture.
- To know SCADA applications, advanced SCADA communications and SCADA protocols

Course Outcomes :

CO1: List the subsystems used to build a telemetry system and to classify the methods of telemetry

CO2: To know the appropriate use of land line and radio telemetry and to list various transmitting and receiving techniques in radio telemetry.

CO3: To list SCADA system components, distinguish various communication philosophies and to use appropriately

CO4: To list and distinguish various SCADA communication technologies and SCADA communication protocols

Syllabus :

UNIT-I

TELEMETRY FUNDAMENTALS AND CLASSIFICATION: Fundamental concepts, significance, principles, functional blocks of Telemetry and Tele control system - Methods of telemetry – Electrical, pneumatic, Hydraulic and optical telemetry – state of the art. Telemetry standards.

UNIT-II

LAND LINE TELEMETRY: Electrical telemetry – current systems – voltage systems – Synchro systems – Frequency systems – position and pulse systems – Example of land line telemetry system.

RADIO TELEMETRY: Block diagram of a Radio telemetry system – Transmitting and receiving techniques – AM, FM, PM, Multiplexing and Demultiplexing – Transmitting and receiving techniques – Digital coding Methods – Advantages of PCM, PWM, PDM, FSK – Delta Modulation – coding and decoding equipment, Example of a radio telemetry system.

UNIT-III

Introduction to SCADA : Introduction, Data Acquisition System, Evolution of SCADA, Communications in SCADA, selection criteria of DAS.

SCADA System components: Introduction, Remote Control Unit (RTU), Intelligent electronic devices, programmable logic controller, data concentrators and merging units, master control centres(MCC), Global positioning system(GPS) - Relevance to

SCADA, Human Machine interface(HMI), HMI building blocks.
SCADA Architecture : Introduction, communication architecture, communication philosophies, System reliability and availability, design and configuration considerations of MCC

UNIT-IV

SCADA Applications : Introduction, power sector, oil and gas industry, automobile industry, water distribution sector.
Advanced SCADA communications : Introduction, types of transmission, guided media, unguided media, SCADA communication technologies, security in wireless communications
SCADA and DCS protocols : Introduction, evolution of SCADA communication protocols, SCADA communication protocols, other relevant standards, secure communication, selecting the right protocol for SCADA

Text Books:

1. Gruenberg, Handbook of telemetry and remote control, Mc Graw Hill, New York, 1987.
2. Swoboda G, Tele control methods and applications of telemetry and remote control, Reinhold Publishing Corporation, London 1991.
3. K S Manoj , Industrial automation with SCADA, Notion press, Chennai

Reference Books:

1. Young R.E., Telemetry Engineering, Little Books Ltd., London 1988
2. Houslay T. Data Communication and Teleprocessing System, Prentice Hall.
3. Stuart A Boyer,SCADA Supervisory control and Data Acquisition ,ISA-international Society of Automation
4. Vikalp Joshi, Manoj singh Adhikari, Raju patel, Rajesh Singh, Anita Gehlot, Industrial Automation, BPB Publications

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Third Year B. Tech (SEMESTER – V)

PYTHON PROGRAMMING (18EI506)

Lectures: 2	**Tutorial: 1**	**Practical: 2**	**Self Study:0**	**Credits :3**
Continuous Internal Assessment: 50			**Semester End Examination (3 Hours): 50**	

Course Objectives:

- The course shows you how to use the free open-source Python to write basic programs
- level applications using concepts such as Class, BIF of Python,
- understanding of the basic components of computer programming using the Python language
- Understanding how the database and web services can be accessed using python programming.

Course Outcomes :

CO1: Able to apply the principles python programming.

CO2: Write clear and effective python code and Create applications using python programming.

CO3: Implementing and Accessing database using python programming.

CO4: Develop web applications & Web Services using python programming.

Syllabus :

UNIT - I

Introduction to Python Language, Strengths and Weaknesses, IDLE, Dynamic Types, Naming Conventions, String Values, String Operations, String Slices, String Operators, Numeric Data Types, Conversions, Built In Functions

Data Collections and Language Component : Introduction, Control Flow and Syntax, Indenting, The if Statement, Relational Operators, Logical, Operators, True or False, Bit Wise Operators, The while Loop, break and continue, The for Loop, Lists, Tuples, Sets, Dictionaries, Sorting Dictionaries, Copying Collections.

UNIT - II

Object and Classes : Classes in Python, Principles of Object Orientation, Creating Classes, Instance Methods, File Organization, Special Methods, Class Variables, Inheritance, Polymorphism, Type Identification, Custom Exception Classes

UNIT – III

Functions and Modules : Introduction, Defining Your Own Functions, Parameters

Function Documentation, Keyword and Optional Parameters, Passing Collections to a Function, Variable Number of Arguments, Scope, Functions - "First Class Citizens", Passing Functions to a Function, Mapping Functions in a

Dictionary, Lambda, Modules, Standard Modules – sys, Standard Modules – math, Standard Modules – time, The dir Function.

UNIT –IV

I/O and Error Handling In Python : Introduction ,Data Streams,Creating Your Own Data Streams, Access Modes, Writing Data to a File, Reading Data From a File,
Additional File Methods, Using Pipes as Data Streams, Handling IO Exceptions,
Working with Directories, Metadata, Errors, Run Time Errors, The Exception Model,
Exception Hierarchy, Handling Multiple Exceptions.

Text Books:

1. Dive into Python, Mike
2. Learning Python, 4th Edition by Mark Lutz

Reference Books:

1. Programming Python, 4th Edition by Mark Lutz

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Third Year B. Tech (SEMESTER – V)

TRANSDUCERS LAB (18EIL51)

Lectures: 0	**Tutorial: 0**	**Practical: 3**	**Self Study:0**	**Credits :1**
Continuous Internal Assessment: 50		**Semester End Examination (3 Hours): 50**		

Course Objectives:

1. To verify the operation of different transducers.
2. To design/analyse the working of signal conditioning part of each transducers.
3. To measure the linearity ,sensitivity of each transducer in static physical environment.
4. To understand the working of different transducr systems.

Course Outcomes :

CO1: An ability to know the standards to measure and to compute the statistical error analysis.

CO2: An ability to analyze and understand various sensors based on its classification.

CO3: An ability analyze and understand various sensors based working principle.

CO4: An ability to identify the problem use the appropriate sensors with resistive, capacitive, inductive in real time situations.

Syllabus :

LIST OF EXPERIMENTS

1.To study the characteristics of LVDT transducer.
2. To study the characteristics of RTD transducer.
3. To study the characteristics of thermistor transducer.
4. To study the characteristics of thermocouple transducer.
5. To study the characteristics of Pressure transducer.
6. To study the characteristics of Speed transducer.
7. To study the characteristics of Light Dependent resistor.
8. To study the characteristics of load cell transducer.
9. To study the characteristics of Torque transducer.
10. To study the characteristics of Synchro Transmitter receiver
11. To study the characteristics of first order and second order systems
12. To study the characteristics of Hall-effect transducer.
13.To study the testing and calibration of T, J, K ,R and S thermocouples.
14. To study the characteristics of pH Transducer.
15. To design LabVIEW VI for measurement of voltage, current and Power.
16. To study the characteristics Piezo – electric Transducer.
17. To study the Loading effect of Potentiometer.
18.To study the operation of sensor and actuator modules.
19. To study the operation of DAQ system for application with sensor signals.
20. Data acquisition and storage of signals through serial/parallel port (or sound card) to PC.
21. PC based data acquisition using add-on (PCI) card: analog/digital inputs.

22. To study the voltage – intensity characteristics of a photo – transistor
23. To study the ramp response characteristics of filled in system thermometer.
24.To study the characteristics of Angular potentiometer transducer model.
25.To study the Measurement of temp, depth etc by optical fibre sensor.

NOTE:

A minimum of 10(Ten) experiments have to be performed and recorded by the Candidate to attain eligibility for Final Practical Examination.

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Third Year B. Tech (SEMESTER – V)

MICROCONTROLLERS LAB (18EIL52)

Lectures: 0	**Tutorial: 0**	**Practical: 3**	**Self Study:0**	**Credits :1**
Continuous Internal Assessment: 50		**Semester End Examination (3 Hours): 50**		

Course Objectives:

- To learn usage of different instructions of 8051.
- To improve logical thinking to solve a problem
- To practice the interfacing of peripherals to 8051 either with simulation /hardware circuits.

Course Outcomes :

CO1: To learn usage of different instructions of 8051.
CO2: To improve logical thinking to solve a problem
CO3: To practice the interfacing of peripherals to 8051 either with simulation /hardware circuits.
CO4: To practice the interfacing of peripherals to 8051 either with hardware circuits.

Syllabus :

LIST OF EXPERIMENTRS:

1. Addition and subtraction of two 8/16 bit numbers with carry/borrow .
2. Multiplication of 8/16and division of 16/8 bit numbers.
3. BCD operation and reverse and X-OR of given numbers.
4. Subtraction of two 16/32/64 bit numbers (Keil software).
5. Program for swapping and compliment of 8- bit numbers (Keil software).
6. Program to find the largest / Smallest number in given array (Keil software).
7. Interfacing LED to 8051 microprocessor (Keil software).
8. Interfacing buzzer to 8051 microcontroller (Keil software).
9. Interfacing Seven segment to 8051 microcontroller (Keil software).
10. Program to show message on serial monitor(c program).

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Third Year B. Tech (SEMESTER – V)

SIMULATION LAB(CONTROL SYSTEMS) (18EIL53)

Lectures: 0	Tutorial: 0	Practical: 3	Self Study:0	Credits :1
Continuous Internal Assessment: 50		Semester End Examination (3 Hours): 50		

Course Objectives:

- Develop functions to various control systems simulations..
- To determine experimentally the step and impulse responses of a given first order and second order system.
- Determination of root locus plot of a control system
- Determination of Bode plot and Nquist plot for the given systems and also to study the effect of PI&PD controller on system performance

Course Outcomes :

CO1: Acquire the basic knowledge of control engineering and its scope.
CO2: Analyze the mathematical model of a system and determine the response of different order systems for standard input inputs
CO3: Solve the steady state and transient analysis of a system for standard input inputs
CO4: Analyze the stability analysis of a system.

Syllabus :

LIST OF EXPERIMENTS :

1. Familiarization with matlab control system tool box, Matlab /simulink tool box
2. Determination of step & impulse response for a first order unity feedback system.
3. Determination of step & impulse response for a second order unity feedback system
4. Determination of step & impulse response for a type ‘0’, type ‘1’, type ‘2’ systems
5. Determination of bode plot using matlab control system toolbox for 2nd order system &obtain controller specification parameters.
6. Determination of root locus plot using matlab control system toolbox for 2nd order system & obtain controller specification parameters.
7. Determination of nyquist plot using matlab control system toolbox.
8. Study the effect of pi&pd controller on system performance
9. Study the effect of addition of zeros to the forward path transfer function of a closed loop system
10. Study the effect of addition of poles to the forward path transfer function of a closed loop system
11. Block diagram reduction using matlab
12. Digital simulation of linear control systems using simulink .
13. Transfer function analysis of 3rd order using simulink

Note:

A minimum of 10(ten) experiments have to be performed and recorded by the Candidate to attain eligibility for university practical examination.

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Third Year B. Tech (SEMESTER – VI)

INDUSTRIAL INSTRUMENTATION(CODE:18EI601)

Lectures: 4	**Tutorial: 1**	**Practical: 0**	**Self Study:0**	**Credits :4**
Continuous Internal Assessment: 50		**Semester End Examination (3 Hours): 50**		

Course Objectives:

- To deal with various types of Sensors & Transducers for measurement of velocity, acceleration and vibration
- To deal with the measurement techniques of force, torque and pressure
- To deal with the measurement techniques of process parameters flow and level
- To deal with the measurement techniques of viscosity, specific gravity, humidity and moisture

Course Outcomes :

CO1: Select the relevant transducer for measurement of velocity, acceleration and vibration to meet the requirements of industrial applications

CO2: Apply most suitable devices for pressure monitoring in real time applications

CO3: Select the relevant transducer for measurement of physical quantities to meet the requirements of industrial applications.

CO4: Compare and select suitable transducer for viscosity, density, humidity and moisture

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Syllabus :

UNIT- I

Introduction: Introduction to Speed/Velocity, Acceleration, Vibration Measurements

Speed/Velocity Measurement: Linear Velocity Measurement techniques: Electro dynamic Transducer, Electro Magnetic Transducer, Doppler transducer, Digital Transducer.

Rotational Speed/Angular velocity Measurement techniques: Revolution counter/Timer, Eddy Current tachometer, DC generator tachometer, AC generator tachometer, Variable reluctance tachometer, Photo-electric pick up, Stroboscope.

Acceleration Measurement: Acceleration Measurement techniques: Seismic Accelerometer, LVDT Accelerometer, Piezo-electric accelerometer, Strain gauge accelerometer.

Vibration Measurement: Vibration Measurement techniques: Capacitive vibration sensor, Inductive vibration sensor, Reed type vibration sensor.

UNIT- II

Force Measurement: Introduction, Force Measurement techniques: Analytical Balance, Unequal lever arm balance, Force balance method, Hydraulic load cell, Pneumatic load cell, Strain gauge load cell, Piezo-electric load cell, Vibration string transducer.

Torque Measurement: Introduction, Torque Measurement techniques: Torque Measurement using stroboscope, Strain gauge torque transducer, Optical torsion meter, Electrical torsion meter.

Pressure Measurement: Introduction, Pressure Measurement techniques: Force summing devices, McLeod gauge, Knudson gauge, thermo couple and Pirani gauges, Ionization gauge.

UNIT- III

Flow Measurement: Introduction, Flow Measurement techniques: Head type devices (Orifice plate, Venturi tube, and Pitot tube), Rota meter, Electromagnetic flow meter, Ultra sonic flow meter.

Level Measurement: Introduction, Level Measurement techniques: Dip sticks (Both ordinary and Optical Dipsticks), Hydro static devices, Ultra sonic level gauge, Radiation level sensor, Vibrating level sensor, Radar Methods, Using Hot-Wire elements, Laser methods, Fiber optic level sensors.

UNIT- IV

Viscosity Measurement: Introduction, Units of Viscosity, Viscosity Measurement techniques: Co-axial cylindrical viscometer, Capillary tube viscometer, Redwood &Say bolt viscometers, Falling sphere viscometer, Two float viscometer, Definition for consistency, Consistency Measurement techniques: Rotating vane consistency meter, Oscillating type consistency meter.

Density/Specific gravity: Introduction, Specific gravity scales/Standards, Density/Specific gravity Measurement techniques: Buoyancy density meter, Hydrometer, Bubbler system, Gamma ray method.

Humidity & Moisture Measurement: Introduction, Humidity Measurement techniques: Hair Hygrometer, Electrical type Humidity transducer, Dry & Wet bulb Psychro meter, Al_2O_3 Hygro meter, Dew-point meter. Moisture Measurement techniques: Dean & Stark technique, Thermal drying technique, Karl Fischer technique, Resistive Moisture sensor, Capacitive Moisture sensor

Text Books:

[1] A.K.Ghosh, "Introduction to Measurements & Instrumentation", IIIrd ed, PHI, 2009.

[2] A.K.Sawhney & Puneet Sawhney, "A Course in Mechnanical Measuremnets & Instrumentation", XIIth ed, Dhanapat Rai & Co., 2012.

[3] D.V.S.Murty, "Transducers & Instrumentation", II^{ed}, PHI. (UNIT IV)

Reference Books:

[1] Ernest O Doebelin, " Measurement Systems", Vth ed,TMH

[2] D.Patranabis, "Sensors and Transducers" II nd ed., PHI, 2013.

[3] BC Nakra, KK Chaudhry "Instrumentation, Measurement and Analysis", II^{ed} TMH.

E-resources and others :

[1] http://nptel.ac.in/courses/108105064

[2] http://nptel.ac.in/courses/108106074

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Third Year B. Tech (SEMESTER – VI)

PROCESS CONTROL (CODE:18EI602)

Lectures: 4	**Tutorial: 1**	**Practical: 0**	**Self Study:0**	**Credits :4**
Continuous Internal Assessment: 50		**Semester End Examination (3 Hours): 50**		

Course Objectives:

- Study the characteristics of physical systems and Controllers
- Realise various controllers and to know the functionality of various final control elements
- Design advanced controller for any given control system
- Tune a controller and to find the mathematical model of any process

Course Outcomes :

CO1: List the process variables for a given system, obtain the mathematical model of it and select a type of controller to control a process variable

CO2: Design various forms of controllers and specify a final control element for a particular application

CO3: Design an advanced control strategy for a control application

CO4: Obtain the mathematical model of any process experimentally and design a control system with suitable controller parameters, Identify the elements in a P&I diagram

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Syllabus :

UNIT-I

Introduction to Process Control:- Definition, Regulatory and servo control, Elements of Process Control, Process Variables, degrees of freedom, Characteristics of liquid System, gas System, thermal System, Mathematical model of liquid process, gas process and thermal process, self regulation.

Controller Characteristics:- The automatic Controller, Proportional Control, Integral Control, Proportional – Integral Control, Proportional Derivative Control, Proportional – Integral Derivative action, Integral windup and Anti-windup, Transient response of control systems using different control modes, Guideline for selection of controller mode, Two position control, Single speed floating Control, Digital version of PID controllers.

UNIT-II

Controlling Elements:- Self operated controller – pneumatic controllers (displacement type), Air supply for pneumatic systems, Hydraulic Controller, electrical and electronic controllers, pneumatic and electric transmission system, voice – coil motor.

Final Control Elements:- Pneumatic actuators, Electro Pneumatic actuators, Hydraulic actuators, Electric motor actuators, Two position motor actuator, sliding stem control valves, rotating shaft Control valves, Fluid flow through control valves, Control valve sizing

UNIT-III

Advanced Control Strategies:- Cascade Control, Analysis of cascade control, feed forward Control, Analysis of feed-forward control, Ratio Control, Dead time Compensation(Smith Predictor), Internal model control, override control, split range control

UNIT-IV

Controller tuning and process identification:- Controller tuning, criteria for good control, Model based controller design methods : Direct synthesis method, internal model control based method, Ziegler – Nichols tuning rules, Cohen coon tuning rules, Controller tuning by damped oscillation method, process identification: step testing, Frequency testing, pulse testing.

P & I Diagram :- Introduction**,** Definitions of terms used in P&I diagrams, Instrument identification, Examples of P&I diagrams

Text Books:

1. Donald P. Eckman: Automatic process Control, Wiley Eastern, New Delhi, 1958
2. Surekha Bhanot : Process control, principles and applications, oxford university press
3. D.R. Coughanowr: Process systems analysis and control (2/e), McgrawHill, NY, 1991

Reference Books:

1. B. Liptak: Process Control: Instrument Engineers Handbook
2. W.L. Luyben and M.L. Luyben: Essentials of Process Control, McgrawHill, NY, 1997
3. Dale E. Seborg, Thomas F. Edgar, Duncan A. Mellichamp, Francis J. Doyle III : process dynamics and control- 4th edition- Wiley
4. Myke King : Process Control A Practical Approach, Wiley
5. Su Whan Sung, Jietae Lee, In-Beum Lee :Process identification and PID control, IEEE press, John Wiley and sons
6. G. Stephanopoulus: Chemical process Control, Prentice Hall of India, New Delhi, 1995
7. Carlos A. Smith : Aotomated continous process control, John Wiley and sons

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Third Year B. Tech (SEMESTER – VI)

DIGITAL SIGNAL PROCESSING (CODE:18EI603)

Lectures: 3	**Tutorial: 1**	**Practical: 0**	**Self Study:0**	**Credits :3**
Continuous Internal Assessment: 50		**Semester End Examination (3 Hours): 50**		

Course Objectives:

- Differentiate the different types of discrete time signals and their representations. Understand the different types of responses of a system.
- Calculate Z-transform and Inverse Z-transform and differentiate the different realization techniques of discrete systems.
- Differentiate the different types of filters and understand the different transformation techniques
- Find the DFT and FFT and understand the importance of FFT in digital signal processing.

Course Outcomes :

CO1: Analyze and process signals in the discrete domain and transform domain.
CO2: Design filters to suit specific applications.
CO3: Able to design & analyze DSP systems like FIR and IIR Filter etc
CO4: Understand the spectral analysis of the signals

Syllabus :

UNIT – I

Discrete Time Signals And Systems: Discrete time signals, Discrete time Systems, Analysis of Discrete Time LTI system, Solution of Linear Constant- Coefficient Difference Equations, The Impulse Response of a LTI Recursive system.

Z-Transforms: Z-transform, Region of convergence, Properties of Z-transforms, Inversion of Z-transform, Causality and Stability of LTI systems in Z-domain, The One Sided Z-transform.

UNIT – II

Fourier Series for Discrete – time Periodic Signals.

DFT: The Discrete Fourier Transform, Properties of the DFT.

FFT: Efficient Computations of the DFT, Radxi-2 DITFFT and DIFFFT algorithms, IDFT using DFT, Applications of FFT algorithms, Quantization Effects in the Computation of the DFT.

UNIT – III

Design of Digital Filters: General Considerations, Design of FIR Filters: Symmetric and Antisymmetric FIR filters, Design of Linear-phase FIR filters using Windows, Design of Linear phase FIR filters by the Frequency-Sampling Method. Structural Realization of FIR Systems: Direct, Canonic, Cascade, Frequency Sampling & Lattice Structure.

UNIT – IV

Design of IIR Filters From Analog Filters: Characteristics of Commonly used

Analog Filters, IIR Filter Design by Approximation of Derivatives, IIR Filter Design by Impulse Invariance, IIR Filter Design by the Bilinear Transformation, Frequency Transformations, Structural Realization of IIR Systems: Direct, Canonic, Transposed, Cascade, Parallel, Lattice-Ladder.

Text Books:

1. John G.Proakis, Dimitris G Manolakis, Digital Signal Processing: Principles, Algorithms and Applications, Pearson Education / PHI, 2003

Reference Books:

1. S K Mitra, Digital Signal Processing: A Computer Based Approach, 2nd Edition, TMH, 2003
2. Lonnie C Ludeman, Fundamentals of Digital Signal Processing, John Wiley & Sons, 2003.
3. Alan V Oppenheim and Ronald W Schafer, Digital Signal Processing, Pearson Education/PHI, 2004 Johnny R. Johnson, Introduction to Digital Signal Processing, PHI, 2001.
4. Andreas Antoniou, Digital Signal Processing, TMH, 2006.

E-resources and others :

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Third Year B. Tech (SEMESTER – VI)

DIGITAL CONTROL SYSTEMS (CODE:18EID21)

Lectures: 3	**Tutorial: 1**	**Practical: 0**	**Self Study:0**	**Credits :3**
Continuous Internal Assessment: 50		**Semester End Examination (3 Hours): 50**		

Course Objectives:

- Represent discrete time systems under the form of Z-domain transfer functions and state space models
- Analyse stability, transient response and steady state behaviour of linear discrete time systems, analytically and numerically using tools
- Design digital control systems using transform techniques and state space models
- Describe the test controllability and observability of linear systems

Course Outcomes :

CO1: Select a suitable sampling period for a given LTI system based on its dynamics and to develop models for various components of a digital control configuration

CO2: List different types of stability, tests for stability, determine gain margin and phase margin of a digital system and to design a digital control system.

CO3: Determine the linearized model of a non linear system and to determine controllability and observability of a discrete time system.

CO4: Design controllers using observer state feedback

Syllabus :

UNIT-I

Introduction to Digital Control : The structure of a digital control system, examples of digital control systems.

Discrete time systems : Analog systems with piecewise constant inputs, difference equations, the Z-transform, computer aided design, Z-transform solution of difference equations, the time response of a discrete time system, the modified Z-transform, frequency response of discrete time systems, the sampling theorem.

Modeling of Digital control systems : ADC model, DAC model, the transfer function of the ZOH, effect of the sampler on the transfer function of a cascade, DAC, analog subsystem, and ADC combination transfer function, systems with transport lag, the closed loop transfer function, analog disturbances in a digital system, steady-state error and error constants, MATLAB commands.

UNIT-II

Stability of Digital Control systems : Definitions of stability, stable Z-domain pole locations, stability conditions, stability determination, Jury test, Nyquist criterion

Digital control system Design : z-domain root locus, z-domain digital control system design, digital implementation of analog controller design, direct z-domain digital controller design, frequency response design, direct control design, finite settling time design.

UNIT-III

State space representation of Digital control system : State variables, state-space representation, linearization of nonlinear state equations, the solution of linear state space equations, the transfer function matrix, discrete time state-space equations, solution of discrete time state-space equations, z-transfer function from state space equations, similarity transformation

Properties of discrete state-space models: Stability of state space realizations, controllability and stabilizability, observability and detectability, poles and zeros of multivariable systems, state space realizations, duality, Hankel realization

UNIT-IV

State feedback control : State and output feedback, pole placement, servo problem, invariance of system zeros, state estimation, observer state feedback, pole assignment using transfer functions.

Optimal control : Optimization, optimal control, the linear quadratic regulator, steady state quadratic regulator, Hamiltonian system

Text Books:

1. M Sami Fadali, Antonio Visioli: Digital Control Engineering : Analysis and design, third edition, Elsevier, Academic press, 2020
2. Hemachandra Madhusudhan Shertukde : Digital control applications illustrated with MATLAB, CRC press

Reference Books:

1. Benjamin C Kuo: Digital control systems, second edition, Oxford University press
Katsuhiko Ogata: Discrete time control systems , Prentice Hall

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Effective From the Academic Year2018-2019(R18 Regulations)

Third Year B. Tech (SEMESTER – VI)

INTERNET OF THINGS(18EID22)

Lectures: 3	**Tutorial: 1**	**Practical: 0**	**Self Study:0**	**Credits :3**
Continuous Internal Assessment: 50		**Semester End Examination (3 Hours): 50**		

Course Objectives:

- Understand the architecture of IOT.
- Understand the protocols of wireless sensor networks
- Understand the design methodologies used in IOT applications.
- To know more about embedded platforms and use them to develop the IOT applications.

Course Outcomes :

CO1: Understand the concepts of Internet of Things

CO2: Analyze basic protocols in wireless sensor network

CO3: Design IoT applications in different domain and be able to analyze their performance

CO4: Implement basic IoT applications on embedded platform

Syllabus :

UNIT - I

Introduction to IoT : Defining IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT, Communication models & APIs
IoT & M2M Machine to Machine, Difference between IoT and M2M, Software define Network

UNIT - II

Network & Communication aspects Wireless medium access issues, MAC protocol survey, Survey routing protocols, Sensor deployment & Node discovery, Data aggregation & dissemination

UNIT - III

Challenges in IoT Design challenges, Development challenges, Security challenges, Other challenges
Domain specific applications of IoT Home automation, Industry applications, Surveillance applications, Other IoT applications

UNIT – IV

Developing IoTs Introduction to Python, Introduction to different IoT tools, Developing applications through IoT tools, Developing sensor based application through embedded system platform, Implementing IoT concepts with python.

Text Books:

1. Vijay Madisetti, Arshdeep Bahga, “Internet of Things: A Hands-On Approach”
2. Waltenegus Dargie,Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice"

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Third Year B. Tech (SEMESTER – VI)

ROBOTICS AND AUTOMATION (18EID23)

Lectures: 3	**Tutorial: 1**	**Practical: 0**	**Self Study:0**	**Credits :3**
Continuous Internal Assessment: 50		**Semester End Examination (3 Hours): 50**		

Course Objectives:

- To understand the basic anatomy of robots and trajectory planning
- To enable students to understand about the work envelopes of robots and its role in automation
- To give an overview of the various methods of control of robots
- To select robots based on their applications and their related issues in industrial automation

Course Outcomes :

CO1: Expertise in fundamentals of Robotics (Unit I)
CO2: Understand the issues related to end effectors and sensors (Unit II)
CO3: Acquire knowledge in Programming and control of Robots (Unit III)
CO4: Understand the issues related to implementation of Industrial Automation with Robot Applications

Syllabus :

UNIT–I

Fundamentals of Robots:Definition –Historical background- Robot Anatomy : Polar, Cylindrical, Cartesian coordinate, Joint-arm configuration–Work volume– Robot Drive System : Hydraulic, Electric, Pneumatic – Control System: Limited sequence, Play back with point to point and Continuous path control Intelligent Robots- Dynamic performance: Speed of response and Stability - Precision of movement: Spatial Resolution, Accuracy, Repeatability and Compliance – Introduction to End effectors, Robotic Sensors, Robot Programming and work cell control.

UNIT–II

Robot End Effectors, Sensors, End Effectors: Types-Mechanical grippers-Magnetic grippers, Vacuum cups, Adhesive gripper, Hooks and Scoops- Tools as end effectors - Robot/ End-effectors, interface- Consideration in Gripper selection and Design.

Sensors: Transducers and Sensors – Sensors in Robotics: Tactile, Proximity, and Range Sensors, Miscellaneous sensors and sensor based systems- Machine Vision System.

UNIT–III

Programming and Control of Robots :Robot Programming: Methods of Programming-: Lead through Methods, Robot program as a path in space- Motion interpolation, WAIT, SIGNAL and DELAY Commands, Branching, Capabilities and limitations of Lead through Methods-

Textual Robot Programming- structure, Motion, End effectors and Sensor

commands, Program control communication, Monitor mode commands Robot Control: Open and Closed loop control- control Problem- Linear control Schemes- Design of Partitioned PD, PID and Adaptive Controllers for Linear Second order SISO Model of robot and their Block schematic representation- Control of Industrial Robots Using PLCs.

UNIT–IV

Automation :Factory Automation: Fixed Automation, Flexible Automation and Programmable Automation. Intelligent Industrial Automation, Industrial Networking, Bus Standards Automatic Feeders, Automatic Storage and Retrieval Systems (AS/RS), Transfer Lines, Automatic Inspection Systems Applications of Robots, Factors influencing the selection of Robots – Robots for Welding, Painting, Assembly, Nuclear, Thermal and Chemical Plants.

Introduction to Mobile Robots, Legged Robots and Remote Controlled Robots, Automated Guided Robots, Micro Robots – Control and Safety Issues.

Text Books:

1. Groover, M.P., Weiss, M., Nagel, R.N., Odrey, N.G., Industrial Robots: Technology, Programming and Applications, McGraw-Hill Book Company, 2012.
2. Mittal R K, Nagrath I J, “Robotics and control”, Tata McGraw Hill, 2010.

Reference Books:

1. Groover, M.P., Automation, Production Systems, and Computer-Integrated Manufacturing, Prentice-Hall of India Private Limited, New Delhi, 2007
2. S.R.Deb, “Robotics Technology and Flexible Automation”, Tata McGraw Hill, 1994
3. Yoran Koren, Robotics for Engineers, McGraw Hill, 1980.
4. Saeed B. Niku, An Introduction to Robotics- Analysis, Systems, Applications, Second Edition, John Wiley & Sons Inc., 2010.
5. Wesley, E. Sryda, “Industrial Robots: Computer interfacing and Control” PHI, 1985.

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Third Year B. Tech (SEMESTER – VI)

OPTIMIZATION IN ENGINEERING DESIGN(18EID24)

Lectures: 3	**Tutorial: 1**	**Practical: 0**	**Self Study:0**	**Credits :3**
Continuous Internal Assessment: 50		**Semester End Examination (3 Hours): 50**		

Course Objectives:

- Understand the need and origin of the optimization methods
- Get a broad picture of the various applications of optimization methods used in engineering
- Define an optimization problem and its various components.
- Determine the advantages and disadvantages of applying different optimization techniques for a specific problem

Course Outcomes :

CO1: Implementing different techniques used in optimization.
CO2: Implementation of optimization problem and its various components.
CO3: Implementing the applications of optimization.
CO4: Comparison of different techniques used in optimization for effective conclusions.

Syllabus :

UNIT - I

INTRODUCTION Optimal problem formulation, Design variables constraints, Objective function, Variable bounds, Engineering optimization problems, Optimization algorithms.

ONE DIMENSIONAL SEARCH METHODS Optimality Criteria, Bracketing methods: Exhaustive search methods, Region - Elimination methods; Interval halving method, Fibonacci search method, Golden section search method, Point-estimation method; Successive quadratic estimation method.

UNIT - II

Gradient-based methods: Newton-Raphson method, Bisection method, Secant method, Cauchy's (Steepest descent) method and Newton's method.

LINEAR PROGRAMMING Graphical method, Simplex Method, Revised simplex method, Duality in Linear Programming (LP), Sensitivity analysis, other algorithms for solving LP problems, Transformation, assignment and other applications.

UNIT – III

MULTIVARIABLE OPTIMIZATION ALGORITHM Optimality criteria, Unidirectional search, Direct search methods: Simplex search method, Hooke-Jeeves pattern search method.

CONSTRAINED OPTIMIZATION ALGORITHM Characteristics of a constrained problem. Direct methods: The complex method, Cutting plane method, Indirect method: Transformation Technique, Basic approach in the penalty function method, Interior penalty function method, convex method.

UNIT – IV

ADVANCED OPTIMIZATION TECHNIQUES Genetic Algorithm, Working

principles, GAs for constrained optimization, Other GA operators, Advanced GAs, Differences between GAs and traditional methods. Simulated anneating method, working principles. Particle swarm optimization method, working principles.

Text Books:

1. Optimization for Engineering Design - Kalyanmoy Deb.
2. Optimization Theory and Applications - S.S. Rao.

Reference Books:

1. Analytical Decision Making in Engineering Design - Siddal.
2. Linear Programming – G. Hadley

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Third Year B. Tech (SEMESTER – VI)

OOPS WITH JAVA(18EI605)

Lectures: 3	**Tutorial: 1**	**Practical: 0**	**Self Study:0**	**Credits :3**
Continuous Internal Assessment: 50		**Semester End Examination (3 Hours): 50**		

Course Objectives:

- Know the need for OO paradigm and its implementation
- Know substitutability forms of inheritances
- Know the differences between multi-threading and multi-tasking
- Know event sources, classes & models

Course Outcomes :

CO1: Implementing simple programs using core java
CO2: Implementing the concepts of java(inheritance, interfaces etc.)
CO3: Implementing the exceptions and threads in java.
CO4: Implementing and using AWT tools and develop simple applications.

Syllabus :

UNIT - I

Introduction: Introduction to java, data types, dynamic initialization, scope and life time, operators, control statements, arrays, type conversion and casting, finals & blank finals.

Classes and Objects : Concepts, methods, constructors, usage of static, access control, this key word, garbage collection, overloading, parameter passing mechanisms, nested classes and inner classes.

Inheritance: Basic concepts, access specifires, usage of super key word, method overriding, final methods and classes, abstract classes, dynamic method dispatch, Object class.

UNIT – II

Interfaces: Differences between classes and interfaces, defining an interface, implementing interface, variables in interface and extending interfaces.

Packages: Creating a Package, setting CLASSPATH, Access control protection, importing packages.

Strings: Exploring the String class, String buffer class, Command-line arguments.

UNIT-III

Exception Handling: Concepts of Exception handling, types of exceptions, usage of try, catch, throw, throws and finally keywords, Built-in exceptions, creating own exception sub classes.

Multithreading: Concepts of Multithreading, differences between process and thread, thread life cycle, Thread class, Runnable interface, creating multiplethreads, Synchronization, thread priorities.

UNIT-IV

Applets: Concepts of Applets, life cycle of an applet, creating applets, passing

parameters to applets, accessing remote applet, Color class and Graphics
Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model, handling events.
AWT: AWT Components, windows, canvas, panel, File Dialog boxes, Layout Managers, Event handling model of AWT, Adapter classes, Menu, Menubar.

Text Books:

1. "The Complete Reference Java J2SE", 7th Edition, Herbert Schildt, TMH Publishing Company Ltd, New Delhi.
2. "Big Java", 2nd Edition, Cay Horstmann, John Wiley and Sons, Pearson Education.

Reference Books:

1. "Java How to Program", Sixth Edition, H.M.Dietel and P.J.Dietel, Pearson Education/PHI.
2. "Core Java 2", Vol 1, Fundamentals, Cay.S.Horstmann and Gary Cornell, Seventh Edition, Pearson Education.
3. "Core Java 2", Vol 2, Advanced Features, Cay.S.Horstmann and Gary Cornell, Seventh Edition, Pearson Education.
4. "Beginning in Java 2", Iver Horton, Wrox Publications.
5. "Java", Somasundaram, Jaico.
6. "Introduction to Java programming", By Y.DanielLiang, Pearson Publication.

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Third Year B. Tech (SEMESTER – VI)

CONSTITUTION OF INDIA (18EI606)

Lectures: 3	**Tutorial: 1**	**Practical: 0**	**Self Study:0**	**Credits :3**
Continuous Internal Assessment: 50		**Semester End Examination (3 Hours): 50**		

Course Objectives:

- To Enable the student to understand the importance of constitution
- To know the structure of executive, legislature and judiciary
- To understand philosophy of fundamental rights and duties
- To understand the functionalities of municipalities and Election Commission

Course Outcomes :

CO1: Able to understand the importance of the constitution in a Democratic Society.
CO2: To Learn the structure of executive, legislature and judiciary
CO3: To Learn about Government structures, methods of functioning
CO4: To understand the about the role and functioning of the Municipalities, Election Commission

Syllabus :

UNIT-I

Introduction to Indian Constitution: Constitution' meaning of the term, Indian Constitution - Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive.Principles of State Policy.

UNIT-II

Union Government and its Administration Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, LokSabha, RajyaSabha, The Supreme Court and High Court: Powers and Functions;

UNIT-III

State Government and its Administration Governor - Role and Position - CM and Council of ministers,State Secretariat: Organisation, Structure and Functions. Local Administration - District's Administration Head - Role and Importance

UNIT-IV

Municipalities - Mayor androle of Elected Representative - CEO of Municipal Corporation PachayatiRaj: Functions PRI: ZilaPanchayat, Elected officials and their roles, CEO ZilaPanchayat: Block level Organizational Hierarchy -(Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy.Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate. State Election Commission

Text Books&

Reference Books:

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. ND
2. SubashKashyap, Indian Constitution, National Book Trust
3. J.A. Siwach, Dynamics of Indian Government & Politics
4. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)
5. J.C. Johari, Indian Government and Politics Hans
6. M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice –Hall of India Pvt. Ltd.. New Delhi
7. Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil Right),
Challenges to Civil Rights Guarantees in India, Oxford University Press 2012
8. Indian Government and Politics – D C Das gupta. Vikas Publishing house
9. The Oxford Hand Book of the Indian Constitution, SujitChowdary, MadhavKhosla .
10. Indian Constitution and its features – Astoush Kumar, Anmol Publishers
11. The Constitution of India – Bakshi P M – Universal Law Publishers

E-RESOURCES:

1. nptel.ac.in/courses/109104074/8
2. www.hss.iitb.ac.in/en/lecture-details
3. www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Third Year B. Tech (SEMESTER – VI)

PROCESS CONTROL LAB (18EIL61)

Lectures: 0	**Tutorial:0**	**Practical: 3**	**Self Study:0**	**Credits :1**
Continuous Internal Assessment: 50		**Semester End Examination (3 Hours): 50**		

Course Objectives:

- To understand the performance of various types of controllers
- To know the characteristics of various transmitters
- To tune a controller for a given process
- To Design advanced control systems

Course Outcomes :

CO1: Calculate the sensitivity of transmitters

CO2: Measure rise time, peak time and settling time for the responses obtained, choose a type of controller for better performance

CO3: Design and analyse advanced control systems

CO4: Compute the controller parameters for a given process

Syllabus :

LIST OF LAB EXPERIMENTS

1. Response of pressure control loop with PI,PD and PID controllers
2. Characteristic of pressure transmitter
3. Response of level control loop with PI,PD and PID controllers
4. Characteristic of level transmitter
5. Response of flow control loop with PI,PD and PID controllers
6. Characteristic of flow transmitter
7. Characteristics of I/P and P/I converters
8. Characteristics of Flopper nozzle system
9. Study of Interacting and Non interacting systems
10. Characteristics of pneumatic control valve
11. Response of first and second order processes with and without transport lag
12. Controller tuning using Ziegler-Nichols Method
13. Controller tuning using Cohen Coon Method
14. Design and analysis Cascade Control
15. Response of Ratio Control
16. Design and analysis of Feed forward Control
17. Design of PID controller with frequency response approach

NOTE: **A minimum of 10 experiments have to be performed and recorded by the Candidate to attain eligibility for University Practical Examination**

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Third Year B. Tech (SEMESTER – VI)

DIGITAL SIGNAL PROCESSING LAB (18EIL62)

Lectures: 0	**Tutorial:0**	**Practical: 3**	**Self Study:0**	**Credits :1**
Continuous Internal Assessment: 50		**Semester End Examination (3 Hours): 50**		

Course Objectives:

- Understand various DSP Algorithms.
- Understand the Magnitude and phase characteristics (Frequency response Characteristics) of digital IIR-Butterworth, Chebyshev filters.
- Understand Magnitude and phase characteristics (Frequency response Characteristics) of digital FIR filters using window techniques.
- Model the Digital Filters.

Course Outcomes :

CO1: Develop various DSP Algorithms.

CO2: Analyze and Observe Magnitude and phase characteristics (Frequency response Characteristics) of digital IIR-Butterworth, Chebyshev filters.

CO3: Analyze and Observe Magnitude and phase characteristics (Frequency response Characteristics) of digital FIR filters using window techniques.

CO4: Design and Analyze Digital Filters.

Syllabus :

LIST OF EXPERIMENTS:

1. Linear convolution between two sequences.
2. Circular convolution between two sequences.
3. Linear convolution using circular convolution.
4. Program to perform N-point DFT. Also to perform the IDFT on the result obtained to verify the result.
5. To perform circular correlation using a) direct method b) circular convolution using rotation method.
6. To perform circular convolution and correlation using DFT.
7. To perform linear convolution using (a) overlap save method (b) overlap add method.
8. To perform FFT on a sequence using the following methods.
   (a) Decimation in time (b) Decimation in frequency.
9. To perform IDFT on a transformed sequence using DFT.
10. Design an FIR filter using windowing techniques.
11. Design an IIR filter using impulse invariant method.
12. Design an IIR filter using bilinear transformation method.
13. Program to compute power density spectrum of a sequence.
14. Filter Design and Analysis.

NOTE:

A minimum of 10 (Ten) experiments have to be performed and recorded by the candidate to attain the eligibility for University Practical Examination.

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Electronics and Instrumentation Engineering

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Third Year B. Tech (SEMESTER – VI)

SOFT SKILLS LABORATORY(18ELL02)

Lectures: 0	**Tutorial:0**	**Practical: 3**	**Self Study:0**	**Credits :1**
Continuous Internal Assessment: 50		**Semester End Examination (3 Hours): 50**		

Course Objectives:

- to understand facial expressions, gestures and postures for effective communication
- to understand the importance of interpersonal and intrapersonal skills in an employability setting
- to understand the process of thinking and analytical skills ethically
- to understand team skills and its effectiveness in inculcating leadership qualities

Course Outcomes :

CO1: Learn how to prepare him/her self for effective communication
CO2: Develop interpersonal and intrapersonal skills for employability.
CO3: Lear the skills about effective thinking and improve the analytical skills.
CO4: Develop leadership qualities.

Syllabus :

1. Body Language & Identity Management

a. Facial Expressions – Kinesics - Occulesics
b. Haptics - Proxemics
c. Para Linguistics
d. Appearance
e. Identity Management Communication

2. Emotional Intelligence & Life Skills

a. Self Awareness through Johari Window and SWOC analysis
b. Self Motivation
c. Empathy
d. Assertiveness & Managing Stress
e. Positive Attitude
f. Time Management
g. Goal Setting: Short term, Long Term, Vision, Mission.

3. Business Presentations

a. Preparing effective Presentations Power Point Presentations
b. Power Point Presentations
c. Using Visual Aids
d. Mock Presentations

4. Employability Skills

a. Group Discussion
b. Team Building and Leadership Qualities
c. Interview Skills

Reference Books:

1. Personality Development and Soft skills (Second Edition), Barun K. Mithra. Oxford University Press: 2016
2. The Definitive Book of Body Language, Allan & Barbara. Pease International:2004
3. Working with Emotional Intelligence, Daniel Goleman. Bloomsbury:1998
4. English for Jobseekers, Lina Mukhopadhyay. Cambridge University Press:2013
5. The 7 Habits of Highly Effective People, Stephen R.Covey. St. Martin's Press:2014

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Fourth Year B. Tech (SEMESTER – VII)

INDUSTRIAL MANAGEMENT & ENTREPRENEURSHIP DEVELOPMENT(18ME002)

Lectures: 4	**Tutorial: 0**	**Practical: 0**	**Self Study:0**	**Credits :3**
Continuous Internal Assessment: 50			**Semester End Examination (3 Hours): 50**	

Course Objectives:

- To provide students an insight into the concepts of industrial management and various forms of business organizations
- It aims to provide the students with an understanding of basics of production systems, productivity and quality. To enable the students to understand the inventory control concept.
- To make the students to learn various financial aspects of the business. To know the depreciation and its methods of measuring depreciation.
- To Provide an understanding of personnel management. Students are exposed to know the importance of Entrepreneurship. To impart the knowledge of marketing to the students

Course Outcomes :

CO1: Describe the roles & d responsibilities and various functions of the management. Learn various forms of business organizations and its dynamics

CO2: Understand concepts of productivity and know the ways of enhancing productivity.

CO3: Develop knowledge about inventory control. Learn how depreciation occurs and various methods of calculating depreciation

CO4: Understand how resources to be planned and also understand various motivation theories and leadership styles. Grasp complete knowledge of importance of entrepreneurship and its prerequisites. Develop ability to understand various marketing strategies to enhance sales promotion

Syllabus :

UNIT – I

General Management: Management definition, Functions of Management and Principles of Management. 4

Scientific Management: Definition, Principles of Scientific Management. 2

Forms of Business Organization: Choice of form of organization, Salient features of Sole Proprietorship, Partnership, Joint Stock Company: Private Limited and Public Limited companies; Cooperative societies, Public sector organizations, State ownership, Public corporation, Merits and demerits of above types. 6

Introduction to Strategic Management 2

UNIT – II

Human Resource Management: Functions of HR management, human resource planning, recruitment, selection, placement, training & development and performance appraisal, Motivation theories, leadership styles. 8

Marketing Management: Concepts of Selling and Marketing, Functions of

Marketing, Marketing mix (4 Ps); Advertising and sales promotion; Product life cycle; distribution channels **6**

UNIT – III

Materials Management: Inventory Control, Inventory costs, Basic EOQ model, Model with Price breaks, ABC analysis, FSN Analysis, VED Analysis. 6

Total Quality Management: Importance of quality, Difference between Inspection and Quality control, Components of total quality, Quality Function Deployment 6

Introduction to Supply Chain Management 4

UNIT – IV

Financial Management: Functions of finance, Types of Capital-Fixed and Working Capital, Break Even Analysis. 6

Entrepreneurship Development: Introduction, Entrepreneurial characteristics, Functions of an Entrepreneur; Factors affecting entrepreneurship; Role of communication in entrepreneurship; Entrepreneurial development-Objectives, Need of Training for enterprises; Finance for the enterprises. 8

Text Books:

1. Essentials of Management /Koontz and Heinz Weihrich/ Tata-McGraw-Hill 10th Ed.
2. Manufacturing Organization and Management / Amrine / Pearson Education
3. Management Science, A. R. Aryasri.

Reference Books:

1. Operations Management, Joseph G Monks.
2. Marketing Management, Philip Kotler.
3. Entrepreneurship, Robert D Hisrich, Michael P Peters, Mathew Manimala and Dean A. Shepherd-McGraw Hill, India-2014 (9th Edition)–ISBN: 9789339205386

E-resources and others :

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Fourth Year B. Tech (SEMESTER – VII)

BIOMEDICAL INSTRUMENTATION (CODE:18EI702)

Lectures: 3	**Tutorial: 1**	**Practical: 0**	**Self Study:0**	**Credits :3**
Continuous Internal Assessment: 50		**Semester End Examination (3 Hours): 50**		

Course Objectives:

- To deal with various types of physiological systems of the human body, and Bio-potentials related to the human body
- To deal with devices used to pick up the bio-signals of the body such as ECG, EEG, EMG
- To deal with the measurement techniques of Cardiovascular parameters such as blood pressure, blood flow, cardiac output and heart sounds
- To deal with the types medical instruments and modern technologies in medical field
- To deal with various types of physiological systems of the human body, and Bio-potentials related to the human body
- To deal with devices used to pick up the bio-signals of the body such as ECG, EEG, EMG
- To deal with the measurement techniques of Cardiovascular parameters such as blood pressure, blood flow, cardiac output and heart sounds

Course Outcomes :

CO1: Understand the physiological nature of biological systems and bio-electric potentials in medical field

CO2: Have a detailed understanding about the various bio-electric signals of the body

CO3: Gain the knowledge on the measurement of non-electrical parameters in the human body

CO4: Understand medical assisting and therapy equipments, clinical instruments such as pacemakers, defibrillators, blood gas analyzers, CT scanner, MRI Scanner, USG…etc.

Syllabus :

UNIT – I

Introduction: Introduction to Bio-Medical Engineering field, Components of Man-Instrument system, problems encountered in measuring a living system

Physiological systems of the Body: Basic Features of cardiovascular system, Nervous system, muscular system, respiratory system.

Resting potential & action potential concepts: Resting potential concept, characteristics of resting potential, action potential concept, propagation of action potential.

Bio-electric potentials: Definition for Bio-electric Potential, Typical Examples of Bio-Electric Potential with important features.

UNIT – II

Bio-Medical Electrodes: Introduction to Bio-Medical Electrodes, Various types of Bio-Medical Electrodes: surface electrodes, micro electrodes, needle electrodes depth electrodes.

Electro Cardiograhphy (ECG): Introduction to electro cardiography, ECG LEAD Concept, various types of ECG Lead configurations, typical ECG waveform details, ECG recording, Analysis of Recorded ECG waveform.

Electro Encephalography (EEG): Introduction to Electro Encephalography, EEG Recording EEG in diagnostics

Electro Myography: Introduction to Electro-Myography, EMG Recording, EMG Applications.

UNIT-III

Cardiovascular Measurements: Introduction to various cardiovascular parameters: Blood Pressure Blood flow, cardiac output, Heart sounds. Blood Pressure Measurement techniques: Direct methods & In-direct Methods.

Blood flow measurement techniques: Electro Magnetic Blood flow meter, ultrasonic Blood flow meter, Thermal convection method. Cardiac output Measurement techniques: Fick's technique, Indicator dillution method, thermal dilution method, Impedance change method. Phono cardiography: Heart sounds Recording

UNIT- IV

Therapeutic Instruments: Cardiac Pacemakers, Types of pacemakers: External pace makers, Internal Pacemakers, Pacing modes, lead wires & Electrodes for internal pacemakers, power sources for implantable cardiac pacemakers, hem dialysis. Cardiac defibrillators, defibrillator electrodes, Introduction to diathermy. Various diathermy apparatus: surgical, shortwave, microwave.

Instruments for clinical laboratory: Introduction to Bio-Chemical electrodes, Types of Bio-Chemical electrodes for measurement of various Blood gas parameters such as Blood P^{H}, $P^{O2}P^{CO2}$ Blood gas analyzer, Blood cell counters.

Modern technologies in Bio-Medical field: Use of X-Rays in medicine, CT scan, ultrasound applications in medicine, MRI scan.

Text Books:

[1] Leslie Cromwell, Fred J. Weibell and Erich A,Pleiffer, " Biomedical instrumentation and Measurements", IInd ed, Prentice Hall of India,2004

[2] R.S Kandpur. " Handbook of Biomedical Instrumentation, IInd ed, Tata McGraw Hill, 2011

Reference Books:

[1] Webster, Medical Instrumentation Application&Design, John Wiley& sons

[2] Jog: Electronics in Medicine and Biomedical Instrumentation, Prentice Hall of India,2006

[3] Dr.M.Armugam,"Biomedical Instrumentation" IInd ed, Anuradha Publications,2009

E-resources and others :

[1] www.iannauniversity.com/2012/07/ei2311-biomedical-instrumentation.html

[2] www.eeeuniversity.com/2013/08/ei2311-biomedical-instrumentation.html

[3] https:// www.scribid.com/doc/.../biomedical-instrumentation-tic-801

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Fourth Year B. Tech (SEMESTER – VII)

ANALYTICAL INSTRUMENTATION(18EI703)

Lectures: 3	**Tutorial: 1**	**Practical: 0**	**Self Study:0**	**Credits :3**
Continuous Internal Assessment: 50		**Semester End Examination (3 Hours): 50**		

Course Objectives:

- Acquire knowledge about the widely used analytical Instruments
- Select Instrument for a particular analysis with come idea of its merits, demerits and limitations
- Know the instruments used in hospital for routine clinical analysis, drug and pharmaceutical laboratories, oil refineries and above all for environmental pollution monitoring
- Able to design various types of spectrometers

Course Outcomes :

CO1: Understand the principles, procedures and applications of Analytical Instrument and analytical techniques.

CO2: Use statistical method for evaluating and interpreting data.

CO3: Appreciate the basic principles of spectroscopy and chromatography techniques.

CO4: Integrate different analytical techniques to solve analytical and bio-analytical problems.

Syllabus :

UNIT – I

Ultraviolet And Visible Spectroscopic Instruments: Radiation sources – Monochromators – filters, prism, grating types – detectors – Recording type of instruments– UV & VIS absorption methods – emission methods – various types of instruments –application in Industry.

UNIT – II

Infrared Spectroscopic Instruments: Fundamentals of Infrared spectrometers – Sources of Infrared – detecting units – different types of Instruments.

Flame Spectrophotometry: Essential parts of flame photometers – different types of flame photometers.

UNIT – III

Nuclear Magnetic Resonance Spectroscopy: Principle of NMR, Measurement of NMR spectrum, Broad band NMR spectrometer – FT NMR spectrometer – application.

Electron Spin Resonance Spectroscopy: Principle of ESR, ESR spectrometer – application.

Mass Spectrometry: Principle of operation – Magnetic deflection Mass Analyzer – Time of flight mass analyzer.

UNIT – IV

Nuclear Radiation Measurements: Nuclear Radiation detectors – Ionization chamber, GM Counter, proportional counter, scintillation counter, solid state detector.

X-Ray Spectroscopy: Introduction, Instrumentation for X-ray spectroscopy, X-ray absorption meter, X-ray diffractometer, X-ray fluorescence spectrometer – application.

Gas and Liquid Chromatography: Chromatography – types- Basic principles of gas chromatography, liquid chromatography (HPLC) - different types of columns, detectors, recorders and associated equipment for Gas and Liquid Chromatography and their applications, Interpretation and Analysis.

Text Books:

1. Willard H.H., Merrit L.L. , Dean J.A., Scattle F.I., Instrumental methods of Analysis, 7th Edn., CBS, 1986.
2. R.S.Khandpur , Handbook of Analytical Instruments, TMH 1989.
3. Skoog D.A., Principles of Instrumental Analysis, Holt Soundes publications, 4th Edn.1982.

Reference Books:

1. Mann C.K., Vicker T.J. & Gullick W.H., Instrumental Analysis , Harper and Row Publishers.

E-resources and others :

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Fourth Year B. Tech (SEMESTER – VII)

DIGITAL IMAGE PROCESSING (18EID31)

Lectures: 3	**Tutorial: 1**	**Practical: 0**	**Self Study:0**	**Credits :3**
Continuous Internal Assessment: 50		**Semester End Examination (3 Hours): 50**		

Course Objectives:

- ❖ Familiarize with basic concepts of digital image processing and different image transforms
- ❖ Learn various image enhancement techniques in spatial domain and frequency domain
- ❖ Learn various image processing techniques for image restoration, segmentation and compression
- ❖ Learnthe image segmentationand image representation methods to get the output of the object

Course Outcomes :

- **CO1:** Understand the fundamentals of digital image processing and image transforms
- **CO2:** Apply image enhancement techniques in spatial domain and frequency domain
- **CO3:** Analyze restoration and compression techniques to improve the fidelity of images.
- **CO4:** Understand the image segmentation and image representation schemes to get the object

Syllabus :

UNIT – I

INTRODUCTION: Fields that use Digital Image processing,Fundamental steps in Digital Image
Processing , Components of an Image Processing System. Digital image fundamentals:
Elements of Visual perception, Image sampling andQuantization, Basic relationships between
Pixels, Linear and Nonlinear operations.
IMAGE TRANSFORMS: Need for image transforms, Discrete Fourier transform (DFT) of two
variables, some properties of the 2-D Discrete Fourier transform. Importance of ,Discrete Cosine transform, Discrete Wavelet transform, Comparison of different image transforms

UNIT – II

IMAGE ENHANCEMENT IN SPATIAL DOMAIN: Some basic gray level transformations,
histogram processing, enhancement using Arithmetic/ Logic operations, Smoothing Spatial
Filters, Sharpening Spatial Filters.
IMAGE ENHANCEMENT IN FREQUENCY DOMAIN: Preliminary concepts,the basics of filtering

in the frequency domain, image smoothing using frequency domain filters, Image Sharpening
using frequency domain filters.

UNIT – III

IMAGE RESTORATION: Noise models, Restoration in the presence of Noise, only Spatial
Filtering, Periodic Noise reduction by Frequency Domain Filtering, Linear, Position-Invariant
Degradations, Inverse Filtering and Wiener Filtering
IMAGE COMPRESSION: Fundamentals, Basic compression methods: Huffman coding, Golomb
coding, Arithmetic coding, LZW coding, Run-Length coding, Bit-Plane coding, Block Transform
coding, Predictive codingFundamentals – Image compression models – Error Free Compression, Lossy Compression

UNIT – IV

IMAGE SEGMENTATION: Detection of discontinuities, Thresholding, Edge basedSegmentation
and Region based Segmentation
IMAGE REPRESENTATION AND DESCRIPTION: Representation Schemes, Boundary
Descriptors, Regional Descriptors.

Text Books:

1. R C Gonzalez and Richard E Woods, Digital Image Processing, Person Education,Second Edition, 2002
2. A R Weeks, Fundamentals of Electronic Image Processing, PHI,2003.

Reference Books:

1. A. K. Jain, Digital Image Processing, PHI, 1989
2. B Chanda and D DuttaMajumder, Digital Image Processing and Analysis, PHI 2001

E-resources and others :

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Fourth Year B. Tech (SEMESTER – VII)

EMBEDDED SYSTEMS(18EID32)

Lectures: 3	**Tutorial: 1**	**Practical: 0**	**Self Study:0**	**Credits :3**
Continuous Internal Assessment: 50		**Semester End Examination (3 Hours): 50**		

Course Objectives:

- To impart knowledge Building Blocks of Embedded System
- To impart knowledge Various Embedded Development Strategies
- To impart knowledge Bus Communication in processors, Input/output interfacing.
- To impart knowledge Various processor scheduling algorithms and Basics of Real time operating system and example tutorials to discuss on one real time operating system tool.

Course Outcomes :

CO1: Ability to understand and analyze Embedded systems.
CO2: Ability to suggest an embedded system for a given application.
CO3: Ability to operate various Embedded Development StrategieS and bus Communication in processors.
CO4: Ability to acquire knowledge on various processor scheduling algorithms and understand basics of Real time operating system.

Syllabus :

UNIT I **(15P)**

INTRODUCTION TO EMBEDDED SYSTEMS

Introduction to Embedded Systems –Structural units in Embedded processor , selection of processor & memory devices- DMA – Memory management methods-Timer and Counting devices, Watchdog Timer, Real Time Clock, In circuit emulator, Target Hardware Debugging.

UNIT II **(15P)**

EMBEDDED NETWORKING

Embedded Networking: Introduction, I/O Device Ports & Buses– Serial Bus communication protocols RS232 standard – RS422 – RS 485 - CAN Bus -Serial Peripheral Interface (SPI) – Inter Integrated Circuits (I2C) –need for device drivers.

UNIT III **(15P)**

EMBEDDED FIRMWARE DEVELOPMENT ENVIRONMENT

Embedded Product Development Life Cycle- objectives, different phases of EDLC, Modelling of EDLC; issues in Hardware-software Co-design, Data Flow Graph, state machine model, Sequential Program Model, concurrent Model, object oriented Model.

UNIT IV **(15P)**

RTOS BASED EMBEDDED SYSTEM DESIGN

Introduction to basic concepts of RTOS- Task, process & threads, interrupt routines in RTOS, Multiprocessing and Multitasking, Preemptive and non-preemptive

scheduling, Task communication shared memory, message passing-, Inter process Communication –synchronization between processes-semaphores, Mailbox, pipes, priority inversion, priority inheritance.

EMBEDDED SYSTEM APPLICATION AND DEVELOPMENT

Case Study of Washing Machine- ATM machine –Digital camera.

Text Books:

1. Raj Kamal, 'Embedded System-Architecture, Programming, Design', Mc Graw Hill, 2013.
2. C.R.Sarma, "Embedded Systems Engineering", University Press (India) Pvt. Ltd, 2013.
3.Embedded Systems Design- A Unified Hardware/ Software Introduction, John Wiley & Sons, Frank Vahid and Tony Givargis
3. Shibu. K.V, "Introduction to Embedded Systems", 2e, Mc graw Hill, 2017.

Reference Books:

E-resources and others :

1. Peckol, "Embedded system Design", John Wiley & Sons,2010
2. Lyla B Das," Embedded Systems-An Integrated Approach", Pearson, 2013
3. Tammy Noergaard, "Embedded Systems Architecture", Elsevier, 2006.
4. Han-Way Huang, "Embedded system Design Using C8051", Cengage Learning, 2009.

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Fourth Year B. Tech (SEMESTER – VII)

CMOS AND ANALOG IC DESIGN. (18EID33)

Lectures: 3	Tutorial: 1	Practical: 0	Self Study:0	Credits :3
Continuous Internal Assessment: 50			Semester End Examination (3 Hours): 50	

Course Objectives:

- Analyse the effect of device and load capacitances on the frequency response of amplifiers and to Understand the phenomenon of noise and its effects on analog circuits
- Describe important benefits that result from feedback ,analyse and design CMOS Operational Amplifiers
- Study the stability and frequency compensation of linear feedback systems, Design of Reference generators in CMOS Technology
- Study switched capacitor amplifiers, analyse the effect of non linearity and mismatch on the performance of analog circuits

Course Outcomes :

CO1: Analyse the effect of active current mirrors on the frequency response of differential pairs, specify the methods of representing noise in circuits along with trade offs with other performance parameters.

CO2: List feedback topologies, their properties and difficulties in feedback circuit analysis, Design of telescopic and folded cascade topologies

CO3: Analyse the impact of frequency compensation on the slew rate of two stage op-amps, Design of reference generators using" bandgap" technologies

CO4: Analyse switched capacitor amplifiers, Define metrics for quantifying the effect of nonlinearity

Syllabus :

UNIT-I

Frequency response of Amplifiers : General considerations, common source stage, source followers, common gate stage, cascade stage, differential pair,gain-bandwidth trade-offs.

Noise : Statistical characteristics of noise, types of noise, representation of noise in circuits, noise in single stage amplifiers, noise in current mirrors, noise in differential pairs, noise-power trade-off, noise bandwidth, problem of input noise integration.

UNIT-II

Feedback : General considerations, feedback topologies, effect of feedback on noise, feedback analysis difficulties, effect of loading, Bode's analysis of feedback circuits.

Operational Amplifiers: General considerations, one-stage op-amps, two stage op-amps, gain boosting, comparison, output swing calculations, common mode feedback, input range limitations, slew rate, high slew rate op-amps, power supply rejection, noise in op-amps.

UNIT-III

Stability and Frequency compensation : General considerations, multipole systems, phase margin, basic frequency compensation, compensation of two stage op-amps, slewing in two stage op-amps, other compensation techniques, Nyquist's stability criterion.

Bandgap References : General considerations, supply independent biasing, temperature independent references, PTAT current generation, constant-Gm biasing, speed and noise issues, low voltage bandgap references.

UNIT-IV

Switched capacitor circuits: General considerations, sampling switches, switched capacitor amplifiers, switched capacitor integrator, switched capacitor common mode feedback.

Nonlinearity : General considerations, nonlinearity of differential circuits, effect of negative feedback on nonlinearity, capacitor nonlinearity, nonlinearity in sampling circuits, linearization techniques.

Mismatch : Effect of mismatch, offset cancellation techniques, reduction of noise by offset cancellation, alternative definition of CMRR

Text Books:

1. Behzad Razavi : Design of Analog CMOS integrated circuits-second edition, Tata Mc-Graw Hill,2018
2. Gray, Hurst, Lewis, Meyer : Analysis and design of analog integrated circuits-fifth edition, Wiley

Reference Books:

1. Tony chan carusone, David A Jones, Kenneth W Martin : Analog integrated circuit design-second edition- John wiley , 2013
2. Erik Bruun : CMOS Analog IC design : Fundamentals -bookboon

E-resources and others :

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Fourth Year B. Tech (SEMESTER – VII)

NON LINEAR AND ROBUST CONTROL (18EID34)

Lectures: 3	Tutorial: 1	Practical: 0	Self Study:0	Credits :3
Continuous Internal Assessment: 50			Semester End Examination (3 Hours): 50	

Course Objectives:

- Understand the basic difference between the linear and nonlinear systems and the basic sources of nonlinearity, understand the basic concepts in analyzing nonlinear systems such as equilibrium points and linearization
- Develop basic skills to investigate second order systems, understand phase plane analysis, limit cycles and their predictions, utilize these ideas in controller design.
- Understand the extensions of frequency domain technique(e.g. describing functions) to nonlinear systems, their limitations and utilize them in controller design
- Understand various concepts of stability in nonlinear systems(e.g.Lyapunov stability), utilize them in solving various stability problems in nonlinear systems, understand the relations between these concepts and their counterparts in linear systems.

Course Outcomes :

CO1: List the methods to study second order dynamic systems along with advantages and disadvantages, Know various concepts of stability, such as Lyapunov stability, asymptotic stability, exponential stability, and global asymptotic or exponential stability

CO2: To characterise the stability behaviours exhibited by nonlinear systems, List various instability theorms and to List the applications of "describing function analysis"

CO3: List the applications of feedback linearization and their limitations and to design a sliding control

CO4: Design adaptive control system for uncertain dynamic system

Syllabus :

UNIT-I

Intoduction : Why nonlinear control?, Nonlinear system behavior

Phase Plane Analysis :Concepts of phase plane analysis, constructing phase portraits, determining time from phase portraits, phase plane analysis of nonlinear systems, existence of limit cycles.

Fundamentals of Lyapunov Theory : Nonlinear systems and equilibrium points, concepts of stability, linearization and local stability, Lyapunov's direct method, system analysis based on Lyapunov's direct method, control design based on Lyapunov's direct method

UNIT-II

Advanced stability theory : concepts of stability for non-autonomous systems, Lyapunov analysis of non-autonomous systems, instability theorms, existence of Lyapunov functions, Lyapunov like analysis using Barbalat's Lemma, positive linear systems, the passivity formalism, absolute stability, establishing boundedness of

signals, existence and unicity of solutions.

Describing function analysis : Describing function fundamentals, common nonlinearities in control systems, Describing functions of common nonlinearities, Describing function analysis of common non linear systems.

UNIT-III

Feedback Linearization : Intuitive concepts, mathematical tools, input state linearization of SISO systems, input-ouput linearization of SISO systems, multi input systems.

Sliding Control : Sliding surfaces, continuous approximations of switching control laws, the modelling/performance trade-offs, multi-input systems.

UNIT-IV

Adaptive Control : Basic concepts in adaptive control, adaptive control of first order systems, adaptive control of linear systems with full state feedback, adaptive control of linear systems with output feedback, adaptive control of nonlinear systems, robustness of adaptive control systems, on-line parameter estimation.

Text Books:

1.Jean-Jacques E.Slotine, Weiping LI : Applied nonlinear control, Prentice Hall
2.Hassan K Khalil : Nonlinear systems, Prentice Hall

Reference Books:

1. Alberto Isidori : Nonlinear control systems, springer
2. M Vidyasagar : Nonlinear system analysis, Prentice Hall
3.Wassim M.Haddad, Vijaysekhar Chellaboina :Nonlinear dynamic system and control,
Princeton University press
4.Mourad Boufadene : Nonlinear control systems using MATLAB , CRC press

E-resources and others :

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Fourth Year B. Tech (SEMESTER – VII)

DATA COMMUNICATIONS (18EID41)

Lectures: 3	Tutorial: 1	Practical: 0	Self Study:0	Credits :3
Continuous Internal Assessment: 50		Semester End Examination (3 Hours): 50		

Course Objectives:

- To understand on the basic concepts of data networks.
- To introduce the basics of internetworking and serial communications.
- To provide details on HART and Field buses and MODBUS, PROFIBUS.
- To learn the concepts of industrial Ethernet and wireless communication.

Course Outcomes :

CO1: Ability to define basic concepts of data communication and its importance and explain the various internetworking devices involved in industrial networks.

CO2: Ability to explain the various serial communication used in process industries and explain the working of HART and Field bus used in process digital communication.

CO3: Ability to summarize the operation of MODBUS, PROFIBUS protocol & its applications.

CO4: Ability to explain and adopt the different Industrial Ethernet protocol and usage of wireless communication in process applications.

Syllabus :

UNIT I 15P

DATA NETWORK FUNDAMENTALS :- Networks hierarchy and switching – Open System Interconnection model of ISO - Data link control protocol - Media access protocol - Command / response - Token passing -CSMA/CD, TCP/IP

UNIT II 15P

INTERNET WORKING - Bridges - Routers - Gateways - Standard ETHERNET and ARCNET configuration special requirement for networks used for control - RS 232, RS 485 configuration Actuator Sensor (AS) – interface, Devicenet

UNIT III 5P

HART AND FIELD BUS AND MODBUS AND PROFIBUS - Introduction - Evolution of signal standard - HART communication protocol - HART networks - HART commands - HART applications - Fieldbus - Introduction - General Fieldbus architecture - Basic requirements of Fieldbus standard - Fieldbus topology - Interoperability - Interchangeability - Introduction to OLE for process control (OPC). MODBUS protocol structure - function codes – troubleshooting Profibus, Introduction, Profibus protocol stack, Profibus communication model - communication objects - system operation - troubleshooting - review of foundation fieldbus - Data Highway

UNIT IV 15P

INDUSTRIAL ETHERNET AND WIRELESS COMMUNICATION -Industrial

Ethernet, Introduction, 10 Mbps Ethernet, 100 Mbps Ethernet - Radio and wireless communication, Introduction, components of radio link - radio spectrum and frequency allocation - radio MODEMs-Introduction to wireless HART and ISA100.

Text Books:

1. BehrouzForouzan ,Data Communications & Networking ,3RD edition, Tata McGraw
hill,2006.
2. William Buchanan, Computer Buses, CRC Press, 2000.

Reference Books:

1. Steve Mackay, Edwin Wrijut, Deon Reynders, John Park, Practical Industrial Data Networks Design, Installation and Troubleshooting' Newnes Publication, Elsevier First Edition, 2004
2. Andrew S. Tanenbaum, David J. Wetherall, Computer Networks, Prentice Hall of India Pvt. Ltd., 5th Edition. 2011.
3. Theodore S Rappaport, Wireless Communication: Principles and Practice, Prentice Hall of India 2nd Edition, 2001.
4. William Stallings, Wireless Communication & Networks, Prentice Hall of India, 2nd Edition, 2005.

E-resources and others :

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Fourth Year B. Tech (SEMESTER – VII)

BIO SIGNAL PROCESSING (18EID42)

Lectures: 3	**Tutorial: 1**	**Practical: 0**	**Self Study:0**	**Credits :3**
Continuous Internal Assessment: 50		**Semester End Examination (3 Hours): 50**		

Course Objectives:

- To understand Sources and characteristics of noise and artifacts in bio signals.
- To understand use of bio signals in diagnosis, patient monitoring and physiological investigation
- To explore research domain in biomedical signal processing.
- To explore application of established engineering methods to complex biomedical signals problems.

Course Outcomes :

CO1: The student will be able to model a biomedical system

CO2: The student will be able to understand various sources of bio signal distortions and its remedial techniques.

CO3: The students will be able to analyze ECG signal with characteristic feature points.

CO4: The students will be able to analyze EEG signal with characteristic feature points.

Syllabus :

UNIT – I

Mathematics for Bio-Medcial Signal Processing: STFT - Introduction to wavelets - CWT and DWT with Haar wavelet, Random Processes: Stationary random process, Ergodicity, Power spectral density and autocorrelation function of random processes. Noise power spectral density analysis, Noise bandwidth and noise figure of systems.

UNIT – II

Data Compression Techniques: Lossy and Lossless data reduction Algorithms. ECG data compression using Turning point, AZTEC, CORTES, Huffman coding, vector quantization, DICOM Standards

UNIT-III

Cardiological Signal Processing: Pre-processing, QRS Detection Methods, Rhythm analysis, Arrhythmia Detection Algorithms, Automated ECG Analysis, ECG Pattern Recognition. Adaptive Noise Cancelling: Principles of Adaptive Noise Cancelling, Adaptive Noise Cancelling with the LMS Adaptation Algorithm, Noise Cancelling Method to Enhance ECG Monitoring, Fetal ECG Monitoring.

UNIT- IV

Neurological Signal Processing: Modeling of EEG Signals, Detection of spikes and spindles Detection of Alpha, Beta and Gamma Waves. Auto Regressive (A.R.) modeling of seizure EEG. Sleep Stage analysis, Inverse Filtering, Least squares and polynomial modeling.

Text Books:

[1] D. C Reddy, "Biomedical Signal Processing, Principles and Techniques", Tata McGraw Hill Publishing Company Limited, First Edition, 2005
[2] Willis J Tompkins, "Biomedical Digital Signal Processing", Prentice Hall India Private Limited, First Edition, 2006.
[3] Peyton Z. Peebles, "Probability, Random Variables & Random Signal Principles", 4th Edition, 2009, TMH.

Reference Books:

[1] Rangaraj M Rangayyan "Biomedical Signal Analysis – A case study approach" IEEE press series in biomedical engineering, First Edition, 2002.
[2] Weitkunat R, "Digital Bio Dignal Processing", 1991, Elsevier.
[3] Akay M, "Biomedical Signal Processing", IEEE Press.
[4] Cohen.A, "Biomedical Signal Processing -Vol. I Time & Frequency Analysis", 1986, CRC Press.

E-resources and others :

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Fourth Year B. Tech (SEMESTER – VII)

ARTIFICIAL INTELLGENCE (18EID43)

Lectures: 3	**Tutorial: 1**	**Practical: 0**	**Self Study:0**	**Credits :3**
Continuous Internal Assessment: 50		**Semester End Examination (3 Hours): 50**		

Course Objectives:

- ❖ understanding of the history of artificial intelligence (AI) and its foundations.
- ❖ understanding the knowledge representation, and learning.
- ❖ Demonstrate awareness and a fundamental understanding of various applications of AI techniques
- ❖ understand the expert system shell, or data mining tool.

Course Outcomes :

CO1: Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations.

CO2: Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.

CO3: Demonstrate awareness and a fundamental understanding of various applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.

CO4: Demonstrate proficiency developing applications in an 'AI language', expert system shell, or data mining tool.

Syllabus :

UNIT – I

PROBLEMS, PROBLEM SPACES AND SEARCH: Defining the problem as a State space Search,, Production Systems, Problem Characteristics, Production system characteristics, Issues in the Design of Search Programs.

HEURISTIC SEARCH TECHNIQUES: Generate-and-test, Hill Climbing, Best-First Search, Problem Reduction, Constraint Satisfaction, Means-Ends Analysis.

UNIT – II

KNOWLEDGE REPRESENTATION USING PREDICATE LOGIC: Representing Simple Facts in logic, Representing Instance and ISA Relationships, Computable Functions and Predicates, Resolution, Natural Deduction.

UNIT – III

REPRESENTING KNOWLEDGE USING RULES – Procedural versus Declarative Knowledge, Logic Programming, Forward versus Backward Reasoning, Matching, Control Knowledge.Semantic Nets, Conceptual dependency, scripts

UNIT - IV

PROLOG Language: Facts, Objects and predicates, Variables, Rules, Input and Output, Arithmetic Operations, Cut, fail Recursion, Lists, string operations, Dynamic

databases.

Text Books:

1. Ellaine Rich & Kevin Knight, Artificial Intelligence, 2nd Edition, TMH, 2003
2. Carl Townsend, Introduction to TURBO PROLOG, BPB Publications, 1988

Reference Books:

1. Patrick Henry Winston, Artificial Intelligence, Pearson Education, 2001
2. Russel and Norvig, Artificial Intelligence, Pearson Education, 2003

E-resources and others :

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Fourth Year B. Tech (SEMESTER – VII)

WIRELESS SENSOR NETWORKS (18EID44)

Lectures: 3	Tutorial: 1	Practical: 0	Self Study:0	Credits :3
Continuous Internal Assessment: 50		Semester End Examination (3 Hours): 50		

Course Objectives:

- Understand different applications of wireless sensor networks
- Gain the knowledge about working of individual sensor nodes can be connected into a wireless sensor network.
- Analyze different communication protocols of wireless sensor networks in real time applications
- Learn about the establishment of wireless sensor network and knowledge of plat forms and tools for the operation of wireless sensor network

Course Outcomes :

CO1: Understand different applications of wireless sensor networks

CO2: Gain the knowledge about working of individual sensor nodes can be connected into a wireless sensor network.

CO3: Analyze different communication protocols of wireless sensor networks in real time applications

CO4: Learn about the establishment of wireless sensor network and knowledge of plat forms and tools for the operation of wireless sensor network

Syllabus :

UNIT – I

OVERVIEW OF WIRELESS SENSOR NETWORKS

Challenges for Wireless Sensor Networks, Enabling Technologies For Wireless Sensor Networks. Single-Node Architecture - Hardware Components, Energy Consumption of Sensor Nodes , Operating Systems and Execution Environments, Network Architecture - Sensor Network Scenarios, Optimization Goals and Figures of Merit, Gateway Concepts.

UNIT – II

NETWORKING SENSORS

Physical Layer and Transceiver Design Considerations, MAC Protocols for Wireless Sensor Networks, Low Duty Cycle Protocols And Wakeup Concepts - S-MAC , The Mediation Device Protocol, Wakeup Radio Concepts, Address and Name Management, Assignment of MAC Addresses, Routing Protocols- Energy-Efficient Routing,Geographic Routing.

UNIT – III

INFRASTRUCTURE ESTABLISHMENT

Topology Control , Clustering, Time Synchronization, Localization and Positioning, Sensor Tasking and Control.

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UNIT – IV

SENSOR NETWORK PLATFORMS AND TOOLS

Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node-level software platforms, Node-level Simulators, State-centric programming.

Text Books:

1. Holger Karl & Andreas Willig, " Protocols And Architectures for Wireless Sensor Networks" , John Wiley, 2005.
2. Feng Zhao & Leonidas J. Guibas, “Wireless Sensor Networks- An Information Processing Approach", Elsevier, 2007.

Reference Books:

1. Kazem Sohraby, Daniel Minoli, & Taieb Znati, “Wireless Sensor Networks- Technology, Protocols, And Applications”, John Wiley, 2007.
2. Anna Hac, “Wireless Sensor Network Designs”, John Wiley, 2003.

E-resources and others :

TERM PAPER (14EIL71)

Lectures: 0	**Tutorial: 0**	**Practical: 5**	**Self Study: 0**	**Credits:2**
Continuous Internal Assessment: 50			**Semester End Examination (3 Hours): 50**	

The internal assessment is based on the weekly progress, performance in a minimum of two seminars and the term paper report submitted at the end of the semester.

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Fourth Year B. Tech (SEMESTER – VII)

BIOMEDICAL INSTRUMENTATION LAB (14EIL72)

Lectures: 0	Tutorial: 0	Practical: 3	Self Study: 0	Credits:1
Continuous Internal Assessment: 50			Semester End Examination (3 Hours): 50	

Course Objectives:

- Understand the bio signals.
- Learn how to read the bio signals and the sensors used.
- Study the simulators used in the lab to understand the bio signal behaviour.
- Study the results and interpret them for predictions.

Course Outcomes :

CO1: Read the bio signal from human body using ECG,EMG & EEG sensors.
CO2: Study Of ECG EMG & EEG simulators
CO3: Measure the systolic & diastolic pressure values of human heart using ST2358 simulator
CO4: Develop the results and predict the symptoms of the humans.

Syllabus :

List of experiments :

1. Measurement of Blood Pressure
2. Measurement of Blood PH
3. Measurement of Blood PCO2, PO2
4. Study of ECG
5. Study of EEG,
6. STUDY OF EMG
7. Measurement of heart sounds
8. Measurement of respiration parameters.
9. Study of Electronystagmography.
10. Study of stress test system.

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ADVANCED INSTRUMENTATON LAB (18EIL73)

Lectures: 0	Tutorial: 0	Practical: 3	Self Study: 0	Credits:1
Continuous Internal Assessment: 50			Semester End Examination (3 Hours): 50	

Course Objectives:

- Familiarise with simians and GE funuk PLCs.
- Understand the PLC and implement the algorithms of process with PLC
- Understand the Advances strategies for effective Process Control
- Familiarise the advances in automation tools.

Course Outcomes :

CO1: Develop simple programs using simians and GE funuk PLCs.
CO2: Use the PLC to solve the problems given.
CO3: Apply Advances strategies for effective Process Control
CO4: Use advances in automation tools.

Syllabus :

LIST OF EXPERIMENTS :

1. Temperature control using Programmable logic controllers (PLC)
2. Level control using PLC
3. Pressure control using PLC
4. Motor Speed control using PLC
5. Digital PID controller.
6. Implementation of logic gates, timer and counter using PLC
7. Process control simulator
8. Flame photo meter
9. UV spectrometers
10. IR spectrometers

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Fourth Year B. Tech (SEMESTER – VIII)

VIRTUAL INSTRUMENTATION(18EID51)

Lectures: 3	**Tutorial: 1**	**Practical: 0**	**Self Study:0**	**Credits :3**
Continuous Internal Assessment: 50		**Semester End Examination (3 Hours): 50**		

Course Objectives:

- To understand the basic concepts in virtual instrumentation
- To make the student become competent in using state-of-the-art VI tools.
- To enable the student to gain experience in data acquisition and instrument Control
- To enable the student to aware of analysis tools and applications of Virtual Instrument Software.

Course Outcomes :

CO:1 Develop software program in VI

CO2: Experiment with plug-in DAQ interfaces for prototype measurement systems

CO3: Implement basis concepts incorporating various VI Toolsets based on the application in Virtual Instruments.

CO4: Get the knowledge of Smart Sensors and VI for real time systems, embedded controller, HMI/SCADA software and Active X programming.

Syllabus :

UNIT I **(15P)**

Introduction Virtual Instrumentation: Historical perspective - advantages - block diagram and architecture of a virtual instrument - Conventional Instruments versus Traditional Instruments - data-flow techniques, graphical programming in data flow, comparison with conventional programming.

UNIT II **15P)**

VI Programming Techniques: VIs and sub-VIs, loops and charts, arrays, clusters and graphs, case and sequence structures, formula nodes, local and global variables, State machine, string and file I/O.

UNIT III **(15P)**

Data Acquisition: Introduction to latest ADCs, DACs. Introduction to PC based data acquisition - typical plug-in data acquisition board - multiplexing of analog inputs - single ended and differential inputs - different strategy for sampling of multi channel analog inputs. Concept of universal DAQ card - use of timers/counters

UNIT IV **(15P)**

Toolsets:Use of Analysis tools, Fourier transforms, power spectrum, correlation methods, windowing and filtering. Simulation of level, thermal, reactor processes. On-Off controller PID Controller.

Applications: Virtual Laboratory, Virtual Oscilloscope, Virtual function generator.

Text Books:

1. Jovitha Jerome, "Virtual Instrumentation Using LabVIEW", Eastern Economy Edition, PHI Learning private ltd ,2010
2. N.Mathivanan, "PC-based Instrumentation :Concepts and Practice", Eastern Economy Edition, PHI Learning private ltd ,2007.

Reference Books:

1. Gary Johnson, LabVIEW Graphical Programming, McGraw Hill, 2006.
2. Kevin James, "PC Interfacing and Data Acquisition: Techniques for Measurement, Instrumentation and Control", Newnes, 2000.

E-resources and others :

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Fourth Year B. Tech (SEMESTER – VIII)

INSTRUMENTATION FOR AEROSPACE AND NAVIGATION (CODE: 18EID52)

Lectures: 3	**Tutorial: 1**	**Practical: 0**	**Self Study:0**	**Credits :3**
Continuous Internal Assessment: 50		**Semester End Examination (3 Hours): 50**		

Course Objectives:

- The students will have an idea about the history of flight.
- The students will have an idea about the parts of an aircraft.
- The students will have an idea about how an aircraft flies.
- The students will be familiar with the basics of navigation and instrumentation used in aerospace engineering.

Course Outcomes :

CO:1 be familiar with the basics of aerospace engineering and navigation.
CO2: have an idea about the instrumentation used in aerospace engineering
CO3: Compare the features of various flight control systems.
CO4: Acquire and interpret data from various aircraft instruments.

Syllabus :

UNIT-I

History of aviation and space flight- anatomy of airplane and space vehicle with emphasis on control surfaces- airfoil nomenclature- basics of aerodynamics to illustrate lift and drag- types of drag – finite wings – swept wings –flaps.
Airplane performance- thrust –power- rate of climb absolute and service ceiling- range and endurance. Introduction to turbojet and turbofan engines. Space vehicle trajectories- Kepler's laws- rocket engines, propellants and staging. (Introductory treatment of the above topics is only expected, no detailed derivations)

UNIT-II

Basic engine instruments- Capacitive fuel content- Gauges. Standard atmosphere- Altimeters Aneroid and radio altimeters. Aircraft compass- Remote indicating magnetic compass- Rate of climb indicator- Pitot static system- Air speed indicator- Mach meters- Integrated flight instruments.

UNIT-III

GPS and GNSS, - Automatic Pilots- Aircraft flight simulation instrumentation Introduction to guidance, navigation and avionics- Radio navigational aids- automatic direction finder VHF- Phase- Comparison direction finder.

UNIT-IV

Introduction to navigation and guidance instrumentation- Principle, construction and applications of inertial sensors- Gyroscope and accelerometers- Ring laser gyroscope- Fibre optic gyroscope, MEMS gyroscopes and accelerometers..

Text Books:

1. Nagaraja.M.S, Elements of electronic navigation, Tata McGraw Hill.
2. Pallet.E.H.J , Aircraft instruments- Principles and applications, Pitman Pub.
3. Ernest O Doebelin, Dhanesh N Manik , Measurement Systems-Application and Design,5th Edition, Tata McGraw Hill, 2007

Reference Books:

1. Jewel B Barlow, William H. Rae, Jr. , Alan Pope , Low-Speed Wind Tunnel Testing, John Wiley, Third Edition, 1999
2. Marcel J. Sidi, Spacecraft Dynamics and Control-A Practical Engineering Approach, , Cambridge University Press, 1997

E-resources and others :

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Fourth Year B. Tech (SEMESTER – VIII)

PROGRAMMABLE LOGIC CONTROLLERS (CODE: 18EID53)

Lectures: 3	Tutorial: 1	Practical: 0	Self Study:0	Credits :3
Continuous Internal Assessment: 50		Semester End Examination (3 Hours): 50		

Course Objectives:

- Identify and explain the main design characteristics, internal architecture and operating principle of PLCs
- To study PLC programming using ladder logic
- To know PLC Functions and data handling operations
- To design a control system using PLC

Course Outcomes :

CO:1 Select the required input output devices for a specific PLC application
CO2: Program the PLC using ladder logic for a specific application
CO3: Apply timer, counter functions and data handling functions in programming
CO4: Interface analog modules to PLC , Design and tuning of PID controller using PLC

Syllabus :

UNIT-I

PLC Basics: PLC system, I/O modules and interfacing, CPU processor, programming Equipment, programming formats, construction of PLC ladder diagrams, Devices connected to I/O modules.

PLC Programming: Input instructions, outputs, operational procedures, programming examples using contacts and coils. Drill press operation

UNIT-II

Digital logic gates, programming in the Boolean algebra system, conversion examples

Ladder Diagrams for process control: Ladder diagrams & sequence listings, ladder diagram construction and flowchart for spray process system.

PLC Registers: Characteristics of Registers, module addressing, holding registers, Input Registers, Output Registers.

UNIT-III

PLC Functions: Timer functions & Industrial applications, counters, counter function Industrial applications, Arithmetic functions, Number comparison functions, number conversion functions

Data Handling functions: SKIP, Master control Relay, Jump, Move, FIFO, FAL, ONS, CLR & Sweep functions and their applications

UNIT-IV

Bit Pattern and changing a bit shift register, sequence functions and applications, controlling of two-axis & three axis Robots with PLC, Matrix functions.

Analog PLC operation: Analog modules& systems, Analog signal processing, Multi bit Data Processing, Analog output Application Examples, PID principles, position indicator with PID control, PID Modules, PID tuning, PID functions.

Text Books:

1. Programmable Logic Controllers- Principles and Applications by John W. Webb & Ronald A. Reiss, Fifth Edition, PHI
2. Programmable Logic Controllers- Programming Method and Applications – JR.Hackworth &F.D Hackworth Jr. –Pearson, 2004

Reference Books:

E-resources and others :

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Fourth Year B. Tech (SEMESTER – VIII)

NUCLEAR MEDICINE (CODE: 18EID54)

Lectures: 3	Tutorial: 1	Practical: 0	Self Study:0	Credits :3
Continuous Internal Assessment: 50		Semester End Examination (3 Hours): 50		

Course Objectives:

- Understand the principle and practices of nuclear medicine.
- Study of computer tomography.
- Apply the image processing concepts medical images.
- Study about different techniques used in therapy.

Course Outcomes :

CO:1 Understand the effects of radiation and safety measure to be followed while using the nuclear equipment in medical diagnostics.

CO2: Understand the principle of computer tomography.

CO3: Applying image processing concepts for CT scanned images.

CO4: Study about methods of different therapies used in medicine.

Syllabus :

UNIT-I

Basic Physics and Radiation Safety in Nuclear Medicine, Interaction of Radiation with Matter, Types of radioactivity, units of radioactivity, Formation of Radionuclides. Radiopharmacy: Basics. Technetium-99m Radiopharmaceuticals, Radiopharmaceuticals, Pharmacokinetics.

UNIT-II

Single-Photon Emission Computed Tomography (SPECT) Elements of Gamma Camera, Positron Emission Tomography (PET): Combined PET/CT Imaging Detectors: Nonscintillation Detectors, Nonimaging Scintillation Detectors, 52 Radiation Dosimetry: Definitions and Basic Quantities. Formulations, Models, and Measurements.

UNIT-III

Image Analysis, Reconstruction and Quantitation in Nuclear Medicine Fundamentals of Image Processing in Nuclear Medicine. Emission Tomography and Image Reconstruction Quantitative SPECT Imaging Quantitative Cardiac SPECT Imaging

UNIT-IV

Radiotherapy: Metabolic radiotherapy, Radioimmunitherapy, Local radiotherapy, Targeted radiotherapy, alpha immunotherapy, neutron capture therapy, dose and mechanism

Text Books:

1. Essential Nuclear Medicine Physics by Rachel A. Powsner and Edward R. Powsner, Blackwell Publishing, 2006 •
2. Basic Sciences of Nuclear Medicine by Khalil, Springer publications •

Reference Books:

1. Text book of Nuclear medicine by A.F.G. Roche •
2. Medical radiation Physics by William Hendey

E-resources and others :

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Fourth Year B. Tech (SEMESTER – VIII)

OPTOELECTRONICS AND LASER INSTRUMENTATION (CODE: 18EID61)

Lectures: 3	**Tutorial: 1**	**Practical: 0**	**Self Study:0**	**Credits :3**
Continuous Internal Assessment: 50		**Semester End Examination (3 Hours): 50**		

Course Objectives:

- Students will be able to **understand** the basic principles of optical fiber, types of optical fiber, optical sources and optical fiber fabrication.
- Students will be able to **understand** the working of fiber optic sensors
- Students will attain deep **knowledge** about the Interferometers
- Students will be able to **understand** and gain **knowledge** on LASERS

Course Outcomes :

CO:1 Specify and operate optical test instrumentation, for example, optical spectrum analyzers and laser beam profilers.

CO2: Align, maintain and operate optical components and support and positioning equipment.

CO3: Survey a laser work area, citing unsafe conditions present.

CO4: Gain knowledge about Holographic techniques and medical applications of laser

Syllabus :

UNIT-I

Introduction to optical fiber communication system, advantages of optical fiber communication. Ray theory transmission: Acceptance angle ,Numerical aperture, skew rays. Types of optical fibers: single step ,graded index, single mode fiber and its cutoff wavelength. Transmission characteristics of optical fibers: Attenuation: intrinsic and extrinsic, Linear scattering losses: Rayleigh scattering , mie scattering, Non linear Scattering loss , Fiber bend loss ,Dispersion: Intra model ,Inter model dispersion.

UNIT -II

Optical sources:

LASER :Absorption and emission of radiation, Einstein relations, population inversion, optical feedback and laser oscillation. Optical emission: spontaneous emission, stimulated emission and lasing, Types of Lasers: gain-guided lasers, index guided lasers, quantum well lasers. Non semi conductor lasers: Nd:yag laser, Ruby laser,Co2 laser Laser Instrumentation ; Industrial applications of Lasers, bio medical application, Laser Doppler velocity meter, hologram and applications

UNIT-III

Fiber optic sensors: Interferometric sensor, Polarization sensor, micro bending fiber sensor, Extrinsic fiber sensors, for measurement of length, displacement, velocity, pressure, temperature, current, voltage, level, strain .

Optical sources :LED: Advantages of LEDs,LED power , LED internal quantum efficiency, external power efficiency. Types of LEDs : Surface emitter LEDS, Edge emitter LEDS, Super Luminescent LED ,LED characteristics: optical

output power, output spectrum, modulation bandwidth.

UNIT-IV

Optical detectors: Detection principles. Absorption, Quantum efficiency , responsivity.

Semiconductor photo diodes: p-n photo diode, p-i-n photo diode, Avalanche photodiode, silicon reach through avalanche photodiode. Electro-optic modulator , magneto-optic modulator, acoustic -optic modulator, polarization maintaining fibers-applications.

Text Books:

1. Senior J.M., Optical Fiber Communication Principles and Practice, Prentice Hall, 1985
2. Thyagarajan & Ghatak A-Laser theory and applications
3. Bishnu P Pal-Fundamentals of fiber optics in Telecommunications and sensor systems.

Reference Books:

1. Keiser G., Optical Fiber Communication, McGraw-Hill, 1991
2. Ghatak A.K and Thiagarajan K, Optical electronics foundation book, TMH,1991.
3. O.Svelto , " Principles of Lasers " ,Plenum Press.
4. John F. Ready, "Industrial Applications of Lasers", Academic Press, 1978.
5. J.Wilson and J.F.B.Hawkes , "Optoelectronics: An Introduction", Prentice Hall of India.

E-resources and others :

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Electronics and Instrumentation Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Fourth Year B. Tech (SEMESTER – VIII)

MEDICAL IMAGING (CODE: 18EID62)

Lectures: 3	Tutorial: 1	Practical: 0	Self Study:0	Credits :3
Continuous Internal Assessment: 50		Semester End Examination (3 Hours): 50		

Course Objectives:

- To study the production of x-rays and its application to different medical Imaging techniques.
- To study the different types of Radio diagnostic techniques.
- To study the special imaging techniques used for visualizing the cross sections of the body.
- To study the imaging of soft tissues using ultrasound technique

Course Outcomes :

CO:1 Understand the principle of image formation using ultrasound scanning .

CO2: Understand and describe the basics of X-ray imaging modality and its biological effects and describe the fundamentals of CT imaging

CO3: Understand and explain the principles of magnetic resonance imaging.

CO4: Understand and explain the principles radio isotropic imaging and

Syllabus :

UNIT I

ULTRASOUND IN MEDICINE : Production of ultrasound – properties and principles of image formation, capture and display – principles of A-mode, B-mode and M-mode display – Doppler ultra sound and colour flow mapping – applications of diagnostic ultra sound.

UNIT II

X-RAY COMPUTED TOMOGRAPHY : Priniciples of sectional imaging – scanner configuration – data acquisition system – image formation principles – conversion of x-ray data in to scan image – 2-D image reconstruction techniques –Iteration and Fourier method – types of CT scanners.

UNIT III

MAGNETIC RESONANCE IMAGING : Priniciples of MRI pulse sequence – image acquisition and reconstruction techniques – MRI instrumentation magnetic gradient system RF coils – receiver system functional MRI – Application of MRI

UNIT IV

RADIO ISOTOPIC IMAGING : Rectilinear scanners – linear scanners – SPECT – PET Gamma camera radio nuclides for imaging – emission computed CT

INFRA RED IMAGING : Physics of thermography – imaging systems – pyroelectric vidicon camera clinical thermography – liquid crystal thermography

Text Books:

1. Steve Webb, “The physics of medical imaging”, Adam Hilger, Bristol, England, Philadelphia, USA, 1988.

Reference Books:

1. A. C. Kak, “principles of computed tomography”, IEEE press, Newyork
2. G. A. Hay, “Medical Image formation perception and measurement”,
3. Divyendu Sinha & Edward R.Dougherty, “Introduction to Computer Based Imaging Systems”, PHI, 2003.

E-resources and others :

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Electronics and Instrumentation Engineering

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Fourth Year B. Tech (SEMESTER – VIII)

ADVANCED SENSORS (CODE: 18EID63)

Lectures: 3	Tutorial: 1	Practical: 0	Self Study:0	Credits :3
Continuous Internal Assessment: 50		Semester End Examination (3 Hours): 50		

Course Objectives:

- Understand the working principles of various semiconductor sensors and their application
- Understand the working principles of chemical and Biomedical sensors and their application
- Know various micro sensors for measuring various physical quantities
- Know various smart sensors and their application.

Course Outcomes :

CO:1 State the working principle of any semiconductor sensor and its application

CO2: State the working principle of any chemical or Biomedical sensor and its application

CO3: List applications of micro sensors

CO4: Design signal processing for any measurement application

Syllabus :

UNIT – I

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

UNIT – II

CHEMICAL AND BIOMEDICAL SENSORS: Polymers, chemically modified electrodes, Membrane electrodes, Thick Film Devices, catalytic devices, Gas sensors.

OPTICAL SENSORS: Lasers, photo-detectors and optical fibre as sensors, Integrated optics

UNIT – III

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

UNIT – IV

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

Text Books:

1. Middle Hock S and Andel SA – Silicon Sensors, Academic Press, London, 1989
2. Edmonds TE - Chemical Sensors - , Blackie London 1988.
3. Patranabis D – Sensors and Transducers, Wheeler Publishing

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Electronics and Instrumentation Engineering

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ADAPTIVE CONTROL SYSTEMS (CODE: 18EID64)

Lectures: 3	**Tutorial: 1**	**Practical: 0**	**Self Study:0**	**Credits :3**
Continuous Internal Assessment: 50		**Semester End Examination (3 Hours): 50**		

Course Objectives:

- To know the basic ideas of adaptive control and compare different approaches.
- To know the practical aspects of adaptive control such as implementation and applications
- To understand the advantages and shortcomings of adaptive control
- To have a good perspective of adaptive techniques, an active knowledge of the key approaches and a good sense of when adaptive techniques can be used and when other methods are more appropriate.

Course Outcomes :

CO:1 Estimate parameters in dynamic systems and to design self tuning regulator.
CO2: Design Model Reference Adaptive System(MRAS)
CO3: Analyze an Adaptive control system for stability, convergence, robustness and to design stochastic adaptive control.
CO4: Auto tune regulators and to design Robust high gain control and self oscillating controller

Syllabus :

UNIT-I

Adaptive Control : Introduction, linear feedback, effects of process variations, adaptive schemes, the adaptive control problem, applications.

Real time parameter estimation : Introduction, least squares and regression methods, estimating parameters in dynamical system, experimental conditions, simulation of recursive estimation.

Deterministic self tuning regulators : Introduction, pole placement design, indirect self tuning regulators, continuous time self tuners, direct self tuning regulators, disturbances with known characteristics.

UNIT-II

Stochastic and predictive self tuning regulators : Introduction, design of minimum variance and moving average controllers, stochastic self tuning regulators, unification of direct self tuning regulators, , linear quadratic STR, adaptive predictive control.

Model reference adaptive systems : Introduction, the MIT rule, determination of the adaptation gain, Lyapunov theory, design of MRAS using Lyapunov theory, bounded input bounded output stability, applications of adaptive control, output feedback, relations between MRAS and STR, nonlinear systems.

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UNIT-III

Properties of Adaptive systems : Introduction, nonlinear dynamics, adaptation of a feedforward gain, analysis of indirect discrete time self tuners, stability of direct discrete time algorithms, averaging, application sof averaging techniques, averaging in stochastic systems, robust adaptive controllers.
Stochastic Adaptive Control : Introduction, multistep decision problems, the stochastic adaptive eproblem, dual control, sub optimal strategies.

UNIT-IV

Auto tuning : Introduction, PID control, auto tuning techniques, transient response methods, methods based on relay feedback, relay oscillations.
Gain scheduling : Introduction, the principle, design of gain scheduling controllers, nonlinear transformations, applications of gain scheduling.
Robust and self oscillatory systems : Robust high gain feedback control, self oscillating adaptive systems, variable structure systems.

Text Books:

1. Karl Johan Astrom. Bjorn Wittenmark : Adaptive control, second edition, Dover publications.

Reference Books:

1. Petros Ioannou, Baris Fidan : Adaptive control Totorial, Society for Industrial and applied mathematics (SIAM).
2. Gang Feng, Rogelio Lozano, Adaptive Control systems, Newnes publications.
3. Graham C Goodwin, Kwai Sang Sin : Adaptive Filtering Prediction and control, Dover publications.

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Fourth Year B. Tech (SEMESTER – VIII)

PROJECT WORK (CODE: 18EIP81)

Lectures: 0	**Tutorial: 0**	**Practical: 20**	**Self Study:0**	**Credits :10**
Continuous Internal Assessment: 75			**Semester End Examination: 75**	

Course Outcomes :

CO:1 Identify and formulate engineering problems after thorough review of literature.

CO2: Apply the fundamentals of science and technology to solve real world problems.

CO3: Design, Analysis and Investigate to for achieve optimum output that leads to development of innovative tool/system in view of sustainable development and societal responsibilities.

CO4: Acquire the knowledge about report writing, presentation, communication and managerial skills.

The internal assessment is based on the weekly progress, performance in a Minimum of two seminars and the project report submitted at the end of the semester.