DIRECTOR
Institute of Engineering and Technology
JK Lakshmipat University
JAIPUR (Rajasthan)

JK Lakshmipat University

Laliya Ka Vas, P.O. Mahapura, Ajmer Road, Jaipur 302 026

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INSTITUTE OF ENGINEERING AND TECHNOLOGY

4 Year B. Tech Programme

(Branch: Electrical Engineering)

Batch 2012-16

SEMESTER – I - VIII

Curriculum, Detailed Syllabus

&

Scheme of Examination

INSTITUTE OF ENGINEERING AND TECHNOLOGY

VC, JKLU Jaipur: The First Semester Courses of 4-year B Tech Programme have been thoroughly discussed and deliberated upon in the Faculty Council of Institute of Engineering and Technology of JKLU Jaipur for the B.Tech Batch of 2012-16. Recommended and forwarded for Approval

20/07/2012

Director - IET

Academic Section

Approved

22/7/12

HANDOUTS

B. Tech. First Semester-2012

JK Lakshmipat University

Laliya Ka Vas, P.O. Mahapura, Ajmer Road, Jaipur 302 026

Ph.: +91-141-2168272/330/387/393

Teaching and Examination Scheme for 4- Year B. Tech Programme (Batch: 2012-2016)

I & II Semesters (Common to all Branches of Engineering)

Year	Code	Semester I	L T P	C	Code	Semester II	L T P	C
I	LA101	English Communication Skills	2 0 0	2	LA201	Professional Communication Skills	2 0 2	3
	MA101	Engineering Mathematics - I	3 1 0	3	MA201	Engineering Mathematics - II	3 1 0	3
	PH101	Engineering Physics – I	3 1 2	4	PH201	Engineering Physics – II	3 1 2	4
	CH101	Engineering Chemistry - I	3 1 2	4	CH201	Engineering Chemistry -II	3 1 2	4
	CSE101	Computer Programming & IT	3 0 2	4	EE201	Electrical & Electronics Engineering	3 1 2	4
	ID101	Environmental Studies	3 0 0	2	ME201	Engineering Mechanics	3 1 0	3
	ME102	Workshop Practice	0 0 3	2	ME241	Machine Drawing	0 0 3	3
	CE101	Engineering Graphics	0 0 3	2				

L = Lectures; T = Tutorials; P = Practicals; C = Credits; W = Weeks; A = Audit

Teaching and Examination Scheme for 4-Year B. Tech Programme (Batch: 2012-2016)

In Electrical Engineering

Year	Code	Semester I	L T P	C	Code	Semester II	L T P	C
II	EE301	Network Analysis & Synthesis	3 1 0	5.5	EE401	Electrical Machines – II	3 1 2	7
	EE302	Electrical Machines – I	3 1 0	5.5	EE402	Transmission & Distribution of Electrical Power	3 1 0	5.5
	ECE301	Electronic Devices & Circuits	3 1 2	7	ECE402	Digital Electronics	3 0 2	5.5
	ECE302	Measurements & Instrumentation	3 0 2	5.5	ECE403	Electromagnetic Field Theory	3 1 0	5.5
	MA301	Engineering Mathematics – III	3 1 0	5.5	MA402	Numerical & Statistical Analysis	3 0 2	5.5
	HS301	Principles of Management	3 0 0	4	HS401	Principles of Economics	3 0 0	4
Summer Term			**PS501**		**Practice School – I**		**6 W**	**4**
III	EE501	Linear Control Systems	3 1 2	7	EE601	Generation of Electrical Power	3 0 0	4
	EE502	Power System Switchgear& Protection	3 0 2	5.5	EE602	Power System Analysis	3 0 2	5.5
					EE603	Industrial Electronics	3 1 2	7
	EE503	MAT LAB Programming	3 0 2	5.5	EE604	Restructured Power System	3 0 0	4
	ECE501	Linear Integrated Circuits	3 0 2	5.5	MA601	Optimization Techniques	3 1 0	5.5
	ECE505	Engineering Signals & Systems	3 1 0	5.5		Elective – II	3 0 0	4
		Elective – I	3 0 0	4				
IV		Elective – III	3 0 0	4	PS801	Practice School – II / Thesis		16
		Elective – IV	3 0 0	4				
		Elective – V	3 0 0	4				
		Elective – VI	3 0 0	4				
		Elective – VII	3 0 0	4				
	SEM701	Seminar	0 0 4	2.5				

L = Lectures; T = Tutorials; P = Practicals; C = Credits; W = Weeks

List of Electives Courses offered in B. Tech (Electrical Engineering)

Semester	Elective	Code	Course
V	Elective - I	EE 521	Electrical Material
		EE522	Advanced Distribution System
		CSE 301	Data Structures
VI	Elective - II	ECE622	Microprocessors & Interfacing
		ECE602	Digital Communications
		ECE603	Digital Signal Processing
VII	Electives – III/IV/V/VI/VII	EE 721	Power Quality& Utilization of Electrical power
		EE 722	Electrical Installation, Commissioning & Maintenance
		EE 723	EHV AC & DC Transmission
		EE 724	High Power Semiconductor devices
		EE 725	Flexible AC Transmission System
		EE 726	Advanced PID Control
		EE 727	Communication Systems & Network
		EE 728	Electrical Machine Design
		EE 729	High Voltage Engineering
		CSE728	Digital Image Processing
		CSE722	Artificial Neural Network
		CSE 721	Robotics
		ECE 725	IC Technology
		ECE 726	Verilog Hardware Description Language
		ECE 722	Biomedical Engineering
		ME 727	Mechatronics
		ME730	Energy Management & Efficiency
		ME724	Total Quality Management
		ME733	Renewable Energy Resources

CONTENTS

ENGLISH COMMUNICATION SKILLS

Course Code.	:	**LA 101**
Course Title	:	**English Communication Skills**
Course Credits	:	**02**
Total Hours Per Week	:	**2+0+0**
Instructor (s)	:	**Dr Sanjay Kumar**

Course Description:

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competence in students. The prescribed books and the exercises are meant to provide students an extensive exposure into the variegated subtleties and nuances of English discovering and practicing which will help students improve their proficiency in the language.

Scope & Objective:

By focusing on all the four language skills such as listening, speaking, reading and writing (LSRW), the course intends to achieve the following specific objectives:

a. To improve the language proficiency of students in English with emphasis on LSRW skills.
b. To strengthen the skills required to speak with confidence, to read with comprehension, and to write with clarity and precision.
c. To help students employ the study skills and communication skills in formal and informal situations.

Text Books:

Sanjay Kumar and Pushp Lata, *Communication Skills*, New Delhi: OUP, 2011

Reference Books:

R1 Meenakshi Raman and Sangeeta Sharma, *Technical Communication: Principles and Practice*, Second Edition, New Delhi: OUP, 2011.

R2 Krishna Mohan and Meenakshi Raman, *Effective English Communication,* New Delhi: Tata-McGraw Hill, 2000.

R3 Krishna Mohan and N.P.Singh, *Speaking English Effectively,* New Delhi: Macmillan,1994.

R4 V. Sasikumar and P.V. Dhamija, *Spoken English*: A Self-Learning Guide to Conversation Practice, Tata-McGraw Hill, 2007.

R5 Norman Lewis, *Word Power Made Easy*, Delhi: GoyalSaab Publishers and Distributors, 1994.

R6 A.J.Thomson and A.V.Martinet, *A Practical English Grammar,* 4th Edition, New Delhi: OUP, 1999.

R7 Asha Kaul, *Business Communication,* Second Edition, New Delhi: PHI, 2010.

R8 Edgar Thorpe and Showick Thorpe, *Objective English,* 2nd Edition, New Delhi: Pearson Education, 2008.

Course Plan:

Lecture No.	Learning Objectives	Topics to be covered	Reference Chap./ Sec. (Book)
1	Defining Communication with emphasis on various stages and skills in language acquisition	Introduction to the course.	-
2	Introducing students to characteristic features of effective communication; acquainting them with the barriers to communication and suggesting ways to overcome such barriers	Characteristic Features of Effective Communication and Ways to Overcome Barriers to Communication	Chapter 1
3-4	Introducing students to the Basic Etymological Structure of words in English; Discussing various Roots, Prefixes and Suffixes in the class	Vocabulary Extension: Roots, Prefixes and Suffixes	Chapter 8
5	Introducing students to innovative strategies in developing vocabulary. Discussing ways to adding new words through Synonyms, Antonyms, Homophones, One Word Substitution, Situations, etc	Vocabulary Extension: Synonyms, Antonyms, Homophones, One Word Substitution	Chapter 8

6-7	Helping students create situations and use new words added to the vocabulary	Vocabulary Extension: Learning words through Situations	Chapter 8
8	Introduction to Grammar: Revising Basics of English Grammar such as Nouns, Pronouns, Verbs, Adverbs, Adjectives, Conjunctions, Prepositions, Articles, etc.	Basics of English Grammar	Chapter 2 & 3
9-10	Helping students attain more familiarity with Applied English Grammar through concepts such as Tense, Voice, Narration, Non-Finite Verbs, Moods of Verbs, Clauses, Tag Questions, etc	Applied English Grammar	Chapter 2 & 3
11-12	Introduction to Standard English Usage: Avoiding Common Errors, Maintaining Subject-Verb Concord, Placing Dangling Modifiers Appropriately, Avoiding Indianisms, etc.	Standard English Usage	Chapter 3, 4 & 6
13	Giving students an exposure in Listening Skills; Introducing Effective Listening Techniques	Listening Skills	Chapter 9 and the DVD accompanying the book
14	Helping students develop effective listening skills for Listening for General Content; Listening to fill up Information; Intensive Listening; Listening for Specific Information etc	Listening Skills	Chapter 9 and the DVD accompanying the book
15-16	Introducing students to the 20 Vowel Sounds of English. Distinguishing 12 Pure Vowel and 08 Diphthongal glides. Discussing words containing these sounds of English. Giving practice through examples in the class	Phonetics and Spoken English: Sounds of English	Chapter 7
17-18	Introducing students to the24 Consonant Sounds of English. Discussing words containing these sounds of English.	Phonetics and Spoken English: Sounds of	Chapter 7

	Giving practice through examples in the class	English	
19-20	Introducing students to the rules of Word Accent and Weak Forms in English	Introducing students to the rules of Word Accent and Weak Forms in English	Chapter 7
21	Telling students different ways of reading with a purpose. Helping students employ different reading skills such as Skimming, Scanning, Intensive Reading and Extensive Reading; Discussing Tones and Styles; Discourse Features; Developing in students Inferential, Analytical Skills	Reading Comprehension	Chapter 16 & 17
22	Giving students adequate practice in attempting RC Passages by discussing passages of variegated types such as Informative Passages, Analytical Passages, Point of View Passages, Narrative Passages, Abstract Passages, Literary Passages, etc	Reading Comprehension	Chapter 16 & 17
23-24	Introducing students to the basics of Paragraph Writing such as Structure, Unity, Coherence, Emphasis, Expansion in a paragraph	Paragraph Writing	Chapter 5 & 20
25	Helping students inculcate effective paragraph writing techniques by working on a variety of paragraphs such as Descriptive Paragraphs, Argumentative Paragraphs, Abstract Paragraphs, etc	Paragraph Writing	Chapter 20
26	Introducing students to the principles and steps in developing the Art of Condensation; Helping them distinguish between Summary, Abstract, Précis and Synopsis	Art of Condensation	Chapter 18

27	Helping students use principles of Effective Condensation by giving them practice through examples	Art of Condensation	Chapter 18
28	Discussing with students the techniques used for writing effective essays of various types	Essay Writing	Chapter 21

Evaluation Scheme:

EC No.	Evaluation Component	Duration	Marks (100) (%)	Nature of Component
1.	Mid Term Test-I	1 hour	20	Closed Book
2.	Mid Term Test-II	1 hour	20	Open Book
3.	End Term Test / Comprehensive	3 hour	40	Closed Book
4.	Assignments such a Role Play, JAM, Extempore, Paragraph Writing, Vocabulary Exercises, etc.		15	Open/Closed Book
5.	Quiz	20 min.	05	Closed Book

Chamber Consultation Hour: Thursday 3-4 PM

Notices: All notices concerning this course will be displayed on the Notice Board

Make-up policy: Make-up is granted only for genuine cases with valid justification and prior permission from the Instructors.

(Instructor)

ENGINEERING MATHEMATICS-I

Course Code	:	**MA101**
Course Title	:	**Engineering Mathematics – I**
Course Credits	:	**03**
Total Hours per week (L+T+P)	:	**3+1+0**
Instructor(s)	:	**Dr. Umesh Gupta, Dr. Ritu Agrawal**

Course Description

Partial derivative and its applications, Maxima minima of functions of two variables, Vector calculus

Scope & Objective

The objective of this course is to give the students, an understanding of basic calculus and its applications in real world. This serves as a basic course in calculus of several variables and ordinary differential equations. Differential Equation is a natural goal of Calculus and is the most important part of mathematics for understanding Physical sciences and Engineering applications.

Text books

T1 G.B. Thomas, Jr., *Thomas' calculus*, 11th edition (Indian), Pearson education, Delhi, 2008

T2 Dennis G. Zill and Warren S. Wright, *Advanced Engineering Mathematics*, Fourth Edition (Student Edition), Jones & Barlett, Viba, New Delhi, 2011

Reference Books

R1 Rober Wrede, Spiegel M. R., *Schaum's outline of advanced calculus*, 3rd edition, Tata Mc-GrawHill, NewYork, 2011

R2 Peter V. O'Neil, *Advanced Engineering Mathematics*, Seventh Indian Reprint, Cengage Learning, New Delhi, 2011.

R3 Kreyszig, E., *Advanced Engineering Mathematics*, John Willey, Delhi (2011).

R4 Potter M.C., Goldberg J.L., Edward F.A., *Advanced Engineering Mathematics*, 3rd Edition, Oxford University Press, 2005.

Course Plan

Lecture No.	Learning Objectives	Topics to be covered	Reference (Ch. of Text Book)
0	Recall the concepts		
1	Calculus of several variables	Functions of two or more variables, Partial Derivatives	Chapter 14, T1

2-3		Total derivative, Chain Rule	
4		Euler's Theorem	
5		Jacobian and transformation	Chapter 6, R1
6		Applications to errors	Chapter 14, T1
7	Optimization using derivatives, Curve sketching	Maxima-Minima of functions of two variables	Chapter 14, T1
8-9		Lagrange's method	
10-13		Curve tracing: Cartesian, parametric and polar coordinates	Chapter 4, T1
14	Vector function and its derivatives	Vector functions, their derivatives and integration	Chapter 9, T2
15		Arc length and unit tangent vector,	Chapter 13, T1
16		Curvature and unit normal vector	
17		Torsion and unit binormal vector	
18-19	Operations on vector functions	Directional derivative and gradient vectors, Tangent plane	§14.5, T1
20		Divergence and curl of a vector field	Chapter 9, T2
21	Definite Integrals	Integral calculus, Line integral, Arc length	Chapter 6, T1
22-24	Multiple Integrals	Double integral: Area, change of order of integration, changing to polar coordinate	Chapter 15, T1
25		Triple integral: Volume integral	
26-27	Vector Integrals	Vector integration: Line integral, flux, work done, circulation	Chapter 9, T2
28		Path independence, potential function and conservative fields	
29		Surface area and integral	
30	Theorems on Vector Integrals	Green's theorem in the plane	
31		Stoke's theorem	
32		Divergence theorem	
33	Special Integrals	Gamma and beta function	Chapter 15, R1
34-36	Sequence and Series	Sequence and series,	Chapter 11, T1
37	Special Trigonometric Series	Orthogonal function	Chapter 12, T2
38-40		Fourier Series	

Evaluation Scheme:

EC No.	Evaluation Component (EC)	Duration	Weightage	Nature	Scope (No. of Lectures)
1	First Test	60 Min.	20	Closed Book	1 - 10
2	Second Test	60 Min.	20	Open Book	11 – 25
3	Quiz / Assignment / Attendance	To be decided by Instructors	10*	Open/Closed Book	To be decided by Instructors
4	Comprehensive	3 Hrs.	40	Closed Book	1 - 40

* EC No.3 will be based on the weightage of Quiz, Assignment and Attendance.

Chamber Consultation Hour: To be announced in the class.

Make-up Policy: Make-up is granted only for genuine cases with valid justification and prior permission from the Instructor-in-charge.

(Instructor)

ENGINEERING PHYSICS-I

Course Code	:	**PH101**
Course Title	:	**Engineering Physics-I**
Course Credits	:	**04**
Total Hours per Week (L+T+P)	:	**3+1+2**
Instructor (s)	:	**Dr. Kanad Ray, Dr. Vipin Kumar Jain**

Course Description:

Theory: The subject matter of the present course can be divided into two parts namely 'Optics' and 'Modern Physics". The first part covers Interference, Diffraction and Polarization. The second part deals with Wave Mechanics, Nanotechnology and Solar Cell.

Practical: The contents of the present course can be divided into Optics, Electrical & Electronics based experiments.

Scope & Objective:

In the context of this course, the subject Engineering Physics has been treated as an applied science from which a majority of engineering technologies have evolved. The thorough knowledge of the basic principles will help students to understand and apply many aspects of technology more effectively. Engineering Physics Lab exposes the students to experimental methods of Physics and integrates theoretical knowledge and concepts to practical experience.

Text Books:

T1. G.D. Ladiwala and S. S. Sharma, "Engineering Physics-I" New Age International Publication, New Delhi, I edn. 2010.

T2. G.D. Ladiwala and S. S. Sharma, "Engineering Physics-II" New Age International Publication, New Delhi, I edn. 2010.

T3: Lab Manuals for Physics

Reference Books:

R1 Arther Beiser, "Concept of Modern Physics" Tata McGrawHill, New Delhi, 5th edn. 1997.

R2 Ajoy Ghatak, "Optics", Tata McGraw Hill, 4th edn

R3 Eyvind H Wichman, "Quantum Physics" Tata McGraw Hill, Volume 4

R4 Neeraj Mehta, "Applied Physics for Engineers", PHI, I edn. 2011

R5: Dattu R Joshi, "Engineering Physics", Tata McGraw Hill Education Pvt. Ltd. New Delhi, I edn. 2010

Course Plan (Theory):

Lecture No.	Learning Objectives	Topics to be covered	Reference Chap./ Sec. (Book)
1	What is light?	Introduction to optics	Ch-1 of T1 Ch-2 of R2
2-3	Coherence	Spatial Coherence, Temporal coherence, Coherence length, Coherence time and 'Q' factor for light	Ch-3 of T2 Ch-2 of R2
4-5	Newton's rings	Formation of Newton's rings, Measurement of wavelength of light, Diameter of Newton's rings	Ch-1 of T1 Ch-15 of R2
6-7	Michelson's Interferometer	Michelson's Interferometer: Production of circular & straight line fringes	Ch-1 of T1 Ch-15 of R2
8	Application of Michelson's Interferometer	Determination of wavelength of light, Determination of wavelength separation of two nearby wavelengths	Ch-1 of T1 Ch-15 of R2

9-10	Antireflecting films and intereference filters	Elementary idea of anti-reflection coating and interference filters	Ch-1 of T1 Ch-15 of R2 Ch-16 of R2
11-12	Fraunhofer diffraction	Single slit diffraction, position of maxima / minima and width of central maximum, intensity variation.	Ch-3 of T1 Ch-18 of R2
13-14	Grating spectra	Construction and theory. Formation of spectra by plane transmission grating, Determination of wavelength of light using plane transmission grating	Ch-3 of T1 Ch-18 of R2
15-16	Resolving Power	Introduction, Raleigh criterion, Resolving power of diffraction grating.	Ch-3 of T1 Ch-18 of R2
17-18	Polarization	Plane, circular and elliptically polarized light on the basis of electric (light) vector, Malus law.	Ch-2 of T1 Ch-22 of R2
19	Double refraction	Qualitative description of double refraction	Ch-2 of T1 Ch-22 of R2
20-22	Analysis of polarized light	Quarter and half wave plates, construction, working and use of these in production and detection of plane, circular and elliptically polarized light.	Ch-2 of T1 Ch-22 of R2
23-25	Optical activity	Introduction and law of optical rotation, specific rotation and its measurement using the half-shade and bi-quartz device.	Ch-2 of T1 Ch-19 of R2
26-27	Concept of Quantum Mechanics	Heisenberg's Uncertainty Principle, Wave and Particle Duality of Radiation, De-Broglie's Concept of Matter waves, Quantum Nature of Light	Ch-4 of T1 Ch 2 of R4
28-29	Experimental proof of Quantum Mechanics	Photoelectric Effect and Compton Effect	Ch-4 of T1
30	Concept of Wave	Concept of Wave Function, Physical	Ch-4 of T1

	Function	interpretation of wave function and its properties	
31-32	Schrödinger's wave equation	Schrödinger's Wave Equation: Time dependent and time independent cases	Ch-4 of T1
33	Application of Schrödinger Equation	Particle in one-dimensional box	Ch-4 of T1
34-35	Nanotechnology and physical properties at Nano scale	Introduction of Nanotechnology, Effect on physical properties due to Nano scale	Ch-22 of R5 Ch-18 of R4
36-37	Methods and Applications	Methods of Nano material construction, Applications	Ch-22 of R5 Ch-18 of R4
38	What is Solar Cell and properties	Introduction to Photovoltaic Cell/Solar Cell and It's Principles	Ch-22 of R5
39-40	Theory, Types and Applications	Theory of Solar Cells, Types of Solar Cells, and Applications	Ch-22 of R5

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (%)	Nature of Component
1.	Mid Term Test-I	1 hour	20	Closed Book
2.	Mid Term Test-II	1 hour	20	Closed Book
3.	End Term Test / Comprehensive	3 hour	40	Closed Book
4.	Assignment(s)/ Quizzes	30 min.	20	Open/Closed Book

Course Plan (Practical):

Lecture No.	Learning Objectives	Reference Book
1-10	To determine the wave length of monochromatic light with the help of Fresnel's Biprism	T1 & T3
	To determine the wave length of sodium light by Newton's Ring	T1 & T3
	To determine the specific rotation of Glucose (Sugar) solution using a Polarimeter	T1 & T3
	To measure the Numerical Aperture of an Optical Fibre.	T1 & T3
	To convert a Galvanometer in to an ammeter of range 1.5/3 amp and calibrate it.	T1 & T3
	To convert a Galvanometer in to a Volt of range 1.5/3 volt and calibrate it.	T1 & T3
	To study the variation of semiconductor resistance with temperature and hence determine the Band Gap of semiconductor in the form of reverse biased P-N junction diode	T1 & T3
	To study the variation of thermo e. m. f. of iron copper thermo couple with temperature	T1 & T3
	To determine the wavelength of sodium light by Michelson Interferometer	T1 & T3
	To determine coherent length and coherent time of laser using He-Ne Laser	T1 & T3

Evaluation Scheme (Practical):

EC No.	Evaluation Component	Duration	Marks (100) (%)	Nature of Component
1.	Mid Term Test-I	2 hour	10	Closed Book

2.	Mid Term Test-II	2 hour	20	Closed Book
3.	End Term Test/Comprehensive	2 hour	40	Closed Book
4.	Attendance	Day to day	10	.....
5.	Continuous evaluation, Discipline, Punctuality, Assignment & Viva Voce	Day to day	20	.....

Chamber Consultation Hour: To be announced in the class.

Notices: All notices concerning this course will be displayed on the Notice Board.

Make-up policy: Make-up is granted only for genuine cases with valid justification and prior permission from the Instructors.

Instructors

ENGINEERING CHEMISTRY-I

Course Code	:	**CH101**
Course Title	:	**Engg. Chemistry-I**
Course Credits	:	**04**
Total Hours per Week (L+T+P)	:	**(2+1+2)**
Instructor (s)	:	**Dr.Mohd. Shahnawaz Khan, Dr. S. K. Tomar**

Course Description:

This first level course is offered in the first semester for the students of all branches of engineering. It provides a comprehensive survey of underlying physical principles, this course divided into five major independents areas of chemistry such as **Water, Polymers, Lubricants, Organic Chemistry (Names Reactions Mechanism & Stereochemistry), Engineering Materials (Cement & Glass).**

Scope & Objective:

The contents of the present course can be divided into five units based on experiments. This course will helpful to students to learn direct commercial industrial application of chemistry as well as experimental methods & instrumental techniques. This course also impart the integrate theoretical knowledge and practical experience into students.

Text Books:

1. Engineering Chemistry by Jain & Jain, **Dhanpatrai publication**

Reference Books:

1- Engineering Chemistry by B Sivasankar, (Mc-Graw Hill publication).
2- Engineering Chemistry by O.G. Palanna, (Mc-Graw Hill publication).
3- Organic Chemistry by Smith, (Mc-Graw Hill publication).
4- Organic Chemistry by IL Finar, (Pearson)
5- Engineering Chemistry (Wiely India publication).

Course Plan (Theory):

Lecture No.	Learning Objective	Topic to be covered	Reference / Text Books
1	Common impurities of water.	Introduction of water impurities	Ch-1; Text

2-4	Hardness of water	Methods for hardness determination	Ch-1; Text
5-8	Municipal water supply	Purification of water	Ch-1; Text
9-12	Softening of water	Method for softening	Ch-1; Text
13-16	Boiler trouble	Boiler problems	Ch-1; Text
17-19	Classification and constituents of polymers	Types of polymers	Ch-3; Text
20-21	Plastics	Plastics	Ch-3; Text
22-24	Rubber	Synthetic & natural rubber	Ch-3; Text
25-26	Introduction of lubricants	General idea of lubricants	Ch-3; Text
27-28	Types of lubricants	Types of lubricants	Ch-10; Text
29-31	Properties of lubricants	Properties	Ch-10; Text
32	Types of silicates & their uses	Types of glass	Ch-10; Text
33	Annealing	Process involve in formation of glass	Ch-14; Ref-5
34-35	Manufacturing of cements	Formation &properties of cement	Ch-14; Ref-5
36	Setting and hardening of cement and role of gypsum.	Chemistry of cement	Ch-14; Ref-5
37-39	Organic Reactions	mechanism	Ch-9; Ref-5 Ch-26; Text
40-42	Stereochemistry	3D configuration of compounds	Ch-27; Text

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (%)	Nature of Component
1.	Mid Term Test-I	1 hour	20	Closed Book
2.	Mid Term Test-II	1 hour	20	Closed Book
3.	End Term Test / Comprehensive	3 hour	40	Closed Book
4.	Assignment(s)/ Presentations/ Quizzes	30 min.	20	Open/Closed Book

COURSE PLAN (PRACTICAL)

Text Books:

T1. Jain and Jain, "Engineering Chemistry Book- Dhanpat Rai Publication, New Delhi.

T2. Lab Manuals for chemistry.

Reference Books:

R1 Experimental Chemistry by Vogal

Exp. No.	Learning Objectives	Books
1-10	To determine the hardness of water by complex metric method using EDTA.	T1 & T2
	To determine the hardness of water by HCl method.	T1 & T2
	To determine the amount of free chlorine in given sample.	T1 & T2
	Determination of total residual chlorine in a water sample.	T1& T2
	Determination of free carbon dioxide in a given sample.	T1 & T2
	To determine the viscosity of a given sample of lubricant oil at various temperature.	T1 & T2
	To determine flash and fire point of a given lubricant using Pensky-Martin's apparatus.	T1 & T2
	To determine cloud and pour point of a given sample of lubricating oil using Cloud and Pour point apparatus.	T1 & T2
	Measurement of Nitrate in water sample.	T2 & T2
	Measurement of Oxygen in water sample.	T1& T2

Evaluation Scheme (Practical):

EC No.	Evaluation Component	Duration	Marks (100) (%)	Nature of Component
1.	Mid Term Test-I	2 hour	15	Closed Book
2.	Mid Term Test-II	2 hour	15	Closed Book
3.	End Term Test	2 hour	40	Closed Book
4.	Attendance	Day to day	10	.....
5.	Continuous evaluation, Discipline, Punctuality, Assignment & Viva Voce	Day to day	20	.....

Chamber Consultation Hour: To be announced in the class.

Notices: All notices concerning this course will be displayed on the Notice Board.

Make-up policy: Make-up is granted only for genuine cases with valid justification and prior permission from the Instructors.

(Instructor)

COMPUTER PROGRAMMING & IT

Course Code	:	**CSE101**
Course Title	:	**Computer Programing & IT**
Course Credits	:	**4**
Total Hours Per Week (L+T+P)	:	**3 + 0 + 2**
Instructor (s)	:	**Prof. Devendra Bhavsar, Prof. Alok Agrawal**

Course Description (Theory):

Unit I : Introduction: Stored Program Architecture of Computers, Evolution of Processors (In terms of word length & Speed only), Storage Device- Primary Memory and Secondary Storage, Working Principle of Primary Storage devices- RAM, ROM, PROM, EPROM, EEPROM, Random, Direct, Sequential access methods. Language Translators – Concept of High-Level, Assembly and Low Level programming languages. Working of Assembler, Interpreter and compiler. Representing Algorithms through flow chart, pseudo code, step by step etc.

Unit II : Number System: Data Representation, Concept of radix and representation of numbers in radix r with special cases of r=2, 8, 10 and 16 with conversion from radix r1 to radix r2. R's and (r-1)'s complement. Representation of Integer in sign-magnitude, signed 1's and 2's complement, Floating point representation. Concept of bias and normalization. Representation of alphabets, Binary Codes: Binary arithmetic, Addition and subtraction of Integers and floating point Numbers. Multiplication of Integers. Gray code, BCD 8421 and 2421, Excess-3 and Excess-3 gray codes.

Unit III : Programming in C: Structure of C Program, Concept of Preprocessor, Macro Substitution, Intermediate code, Object Code, Executable Code. Compilation Process, Basic Data types, Importance of braces ({ }) in C Program, enumerated data type, Identifiers, Scope of Variable, Storage Class, Constants, Expressions in C, Type Casting, Control Statements, printf( ), scanf ( ), reading single character, Command Line arguments.

Unit IV : Arrays in C, Pointers, Using pointers to represent arrays, Dynamic Memory allocation, structures, using typedef, Arrays of Structures & pointers, File Handling (Opening in different modes & closing of file, fscanf & fprintf only).

Unit V : Functions in C, Passing Parameters (By value & Reference), using returned data, Passing arrays, structures, array of structures, pointer to structures etc., passing characters and strings, The void pointer.

Scope & Objective

This course is offered as a technical art subject to engineering students. It focuses on training the students rigorously in the skills of a structured programming language, particularly in C and application of such language in problem solving.

Text Books:

T1. Reema Thareja "*Computer Fundamentals and Programming in C*" Oxford Education, first.2012

T2. Balagurusamy, "*Programming in ANSI C*" Tata Mcgraw Hill, sixth, 2012.

Reference Books:

R1 Yashwant Kanetkar, "Let us C" BPB publication, fifth, 2012.

Course Plan (Theory):

Lecture No.	Learning Objectives	Topics to be covered	Reference Chap./ Sec. (Book)
1-2	Introduction	Introduction: Stored Program Architecture of Computers, Evolution of Processors (In terms of word length & Speed only)	CH-1 of T1
3	Storage Devices	Storage Device- Primary Memory and Secondary Storage, Working Principle of Primary Storage devices	CH-4 of T1
4	Memory	RAM, ROM, PROM, EPROM, EEPROM, Random, Direct, Sequential access methods	CH-4 of T1
5-7	Number System	Number System: Data Representation, Concept of radix and representation of numbers in radix r with special cases of r=2, 8, 10 and 16 with conversion from radix r1 to radix r2. r's and (r-1)'s complement	CH-3 of T1
8-9	Number Systems	Representation of Integer in sign-magnitude, signed 1's and 2's complement. Floating point representation	CH-3 of T1
10-11	Binary Codes	Binary Codes: Binary arithmetic, Addition and subtraction of Integers and floating point Numbers	CH-3 of T1
12	Different Number Systems	Multiplication of Integers. Gray code, BCD 8421 and 2421, Excess-3 and Excess-3 gray codes	CH-3 of T1
13	Programing Languages	Language Translators – Concept of High-Level, Assembly and Low Level	CH-7 of T1

		programming languages	
14	Programing Languages	Working of Assembler, Interpreter and compiler	CH-7 of T1
15	Algorithms	Representing Algorithms through flow chart, pseudo code, step by step etc.	CH-7 of T1
16	Programming in C	Programming in C: Structure of C Program, Concept of Preprocessor	CH-8 of T1 CH-1 of T2
17	Programming in C	Macro Substitution, Intermediate code, Object Code, Executable Code. Compilation Process	CH-8 of T1
18-20	Basic Data types	Basic Data types, Importance of braces ({ }) in C Program, enumerated data type	CH-8 of T1 CH-2 of T2
21-22	Identifiers	Identifiers, Scope of Variable, Storage Class, Constants, Expressions in C, Type Casting,	CH-8 of T1
23-24	printf ( ), scanf ()	Control Statements, printf ( ), scanf ( ), reading single character. Command Line arguments	CH-8 of T1
25-27	Decision Makin and Looping	For Loop, While Loop, Do While Loop	Ch-9 of T1 Ch-6 of T2
28	Arrays in C	Arrays in C, Pointers, Using pointers to represent arrays	CH-11 of T1
29-32	Dynamic Memory allocation	Dynamic Memory allocation	CH-13 of T1
33-35	Functions in C	Functions in C, Passing Parameters (By value & Reference) using Return Data	CH-10 of T1
36	Passing arrays	Passing arrays, structures, array of structures,	CH-13 of T1
37-38	pointers	Pointer Basics, The void pointer, pointer to structures etc., passing characters and strings	CH-11 of T2 CH-13 of T1
39-40	File Handling	File Handling (Opening in different modes & closing of file, fscanf & fprintf only)	CH-15 of T1 Ch-10 of R1
41-43	Structures	structures, using typedef, Arrays of Structures & pointers	CH-14 of T1 Ch-12 of R1

Evaluation Scheme (Theory):

Sr. No.	Evaluation Component	Duration (Hours)	Marks (100)	Nature of Component
1.	Midterm test-I	1	20	Closed Book
2.	Midterm test-II	1	20	Closed Book
3.	Assignment	Continuous	10	Open Book
4.	Quiz	Continuous	10	Closed Book
5.	End Term	3	40	Closed Book

Course Description (Practical):

List of Experiments:

1. Simple OS Commands, compiling program, compiler options, linking libraries.
2. Simple input output program integer, real character and string. (Formatted & Unformatted)
3. Conditional statement programs (if, if-else-if, switch-case)
4. Looping Program. (for, while, do-while)
5. Program based on array (one, two and three dimensions)
6. Program using Function (with and without recursion)
7. Simple programs using pointers.
8. File handling.
9. Program using Structure and Union.

Course Plan (Practical)

The lab is to be conducted on Linux platform or Windows using Turbo Compiler. The said experiments have to be performed week wise

Evaluation Scheme (Practical):

Sr. No.	Evaluation Component	Duration (Hours)	Marks (100)	Nature of Component
1.	Mid Term Test-I	2	20	Closed Book
2.	Mid Term Test-II	2	20	Closed Book
3.	Viva voce evaluation	Day to Day	10	Closed Book
4.	Attendance	Day to Day	10	
5.	End Term Examination	2	40	Closed Book

Chamber Consultation Hour: To be announced in the class.

Notices: All notices concerning this course will be displayed on the Notice Board.

Make-up policy: Make-up is granted only for genuine cases with valid justification and prior permission from the Instructors.

(Instructor)

ENVIRONMENTAL STUDIES

Course Code	:	**ID 101**
Course Title	:	**Environmental Studies**
Course Credits	:	**2**
Total Hours per Week (L+T+P)	:	**2 + 0 + 0**
Instructor (s)	:	**Dr. S. K. Tomar**

Course Description:

This course is designed as a compulsory course on Environmental Studies for undergraduate students of all disciplines. Assuming limited background in mathematics and science, it gives a balanced presentation of the major issues and concerns related to the environment.

Scope & Objective:

Environmental studies is considered as one of the basic subjects for all graduate students irrespective of branch as it develops thinking and imaginative capacity of the students. Especially, engineers who can successfully cope with new problems in the field must have a sound understanding of fundamental principles. The present course is designed to prepare the students in this direction. The contents of the syllabus have been developed keeping this in mind, so that students are exposed to a variety of situations that will test their understanding of the subject both at the concepted and analytical skills. This course covers the major environmental problems we face today: runaway growth, imperiled ecosystems, disappearing forests, endangered species, dwindling natural resources, dangerous toxic wastes, green laws, and other such issues.

Text Books:

T-1. Rajagopalan, R., "Environmental Studies: From Crisis to Cure", Oxford University Press, New Delhi, 2e, 2011

Reference Books:

R1 Ranjit Daniels & J. Krishnaswamy "Environmental Studies", Wiley India

R2 Davis & Cornwell "Environmental Engineering", Mc Graw Hill

Course Plan:

Lecture No.	Learning Objectives	Topics to be covered	Reference Chap./ Sec.
1 – 2	The Global Environmental Crisis	Understanding environment	Chap. 1 T-1
3 – 4		The global crisis	
5 – 6	Ecosystems	Basic Concepts	Chap. 2 T-1
7 – 8		Forest and Grassland ecosystems	Chap. 3 T-1
9		Desert Ecosystems	Chap. 3 T-1
10		Aquatic Ecosystems	Chap. 4 T-1
11 – 12	Biodiversity	Introduction to Biodiversity	Chap. 5 T-1
13 – 14		Biodiversity Conservation	Chap. 6 T-1
15	Renewable and Non-Renewable Natural Resources	Introduction	Chap. 7 T-1
16		Water Resources	
17		Energy Resources	Chap. 8 T-1
18		Forest Resources	Chap. 9 T-1
19 – 20		Land, Food, and Mineral Resources	Chap. 10 T-1
21	Environmental Pollution	Introduction	Chap. 11 T-1
22 – 25		Air and Noise Pollution	
26 – 28		Water, Soil, and Marine Pollution	Chap. 12 T-1
29 – 32		Solid Waste Management and Disaster Management	Chap. 13, 14 T-1
33 – 34	Human Population and The Environment	Population Growth	Chap. 15 T-1
35		Environment and Human Health	Chap. 16 T-1
36	Social Issues and The Environment	Sustainable Development	Chap. 18 T-1
37 – 39		Global Warming, Acid Rain, and	Chap. 19 T-1

		Ozone Depletion	
40	Environmental Laws and Regulations	Different types of laws and regulations	Chap. 20 T-1

Evaluation Scheme:

S. No.	Evaluation Component	Duration	Weightage	Date	Nature	Scope (No. of Lectures)
1	First Test	55 Min.	20		Closed Book	1 – 10
2	Second Test	55 Min.	20		Closed Book	11 – 25
3	Quizzes /Assignments (Class room)	To be decided by Instructors	20		Open/Closed Book	To be decided by Instructors
4	Comprehensive	3 Hrs.	40		Closed Book	1 – 40

Chamber Consultation Hour: To be announced in the class.

Make-up Policy: Make-up is granted only for genuine cases with valid justification and prior permission from the Instructor-in-charge.

(Instructor)

WORKSHOP PRACTICE

Course Code	:	**ME141**
Course Title	:	**Workshop Practice**
Course Credits	:	**2**
Total Hours per Week (L+T+P)	:	**0+0+3**
Instructor (s)	:	**Er. Kapender Singh Phogat**

Course Description:

The subject Work-Shop Practice is the most important among all the courses in engineering; it is the heart of all engineering activities. The course is intended to be offered in the first year of engineering to all the discipline students. The course is a basic course and can be studied without any prerequisites though knowledge of materials helps.

After designing a product, it is important to be aware of the manufacturing methods to be able to realize the conceived design in the form of a real product. Also a number of products are an assembly of a number of components and one needs to understand how individual components can be brought together to get the desired product.

The Broad Aim of the course is to enable the student know how products used in day to day life are manufactured. The course also aims at providing students with hands on experience on manufacturing processes that include Machining operations like drilling and grinding, Sheet metal working like bending, shearing & blanking, joining processes like arc welding, gas welding and soldering.

The course aims shall be met through, Class room lectures using electronic media (Power point presentations, Videos), Practical hands on practice in the laboratory, Demonstrations of various machine tool operations in the laboratory.

Scope & Objective:

The Broad Aim of the course is to enable the student know how products used in day to day life are manufactured. This course provides an overview of the basic production techniques and allied/supporting techniques used to produce finished products from raw materials. The course also aims at providing students with hands on experience on manufacturing processes that include Machining operations like drilling and grinding, Sheet metal working like bending, blanking, piercing and beading, joining processes like arc welding and soldering, forging,

casting, and other joining techniques using common machine tools, hand tools and other equipments. Various joining and fitting skills will also be imparted in the practical classes.

Text Books:

T1. H S Bawa, "Workshop Practice", TMH, New Delhi, 2nd Edition, 2011

T2. B S Nagendra Parashar and R K Mittal, "Elements of Manufacturing Process", Prentice Hall of India, New Delhi, 2010 print

T3. B S Raghuwanshi, "A Course in Workshop Technology", Dhanpat Rai & Co., New Delhi, Volume I & II, 2011 reprint,

T4. Serope Kalpakjian and Steven R. Schmid, "Manufactuirng Engineering and Technology," Pearson Education (Low Cost Indian Edition), New Delhi, 4th Edition, 2005

Reference Books:

R1 K. Venkata Reddy, "Workshop Practice Manual", BS Publications, Hyderabad,6th Edition, 2011 print

R2 P. kannaiah and K. L. Narayana, "Engineering Practices Laboratory", SciTech Publications, Chennai, 2006

COURSE PLAN (PRACTICAL)

Course plan is meant as a guideline and there may be minor deviations while covering the syllabus.

Week/ LabNo.	Learning Objectives	Topics to be covered	Reference Chap./ Sec. (Book)/Manual
1	Introduction to course	Basics of manufacturing, types of production systems, ethics, safety in workshop.	T1- Ch. 1-Art. 1.1-1.10 Ch.14, Art. 14.1-14.11
	Role of measurements and quality in manufacturing.	Metrology, quality, Least Count of a measuring Instrument, measurement with Varnier Caliper or Micrometer.	T1- Ch. 3 Art. 3.1 – 3.32
2	Understand the salient construction details of machine tools including Lathe, and Grinding machine.	Machining – Demonstration of Turning, Step Turning,	T3- Vol. II Ch. 6-Article 6.2-5, 6.30 Ch. 13- Articles

	Demonstrate turning, facing, and grinding operations. Distinguish between single point and multi-point cutting tools.	Facing, etc.	13.29
3	Understand principles of producing components/products by casting process. Demonstrate steps in sand casting process.	Casting – Demonstration of sand casting process	T3- Vol. I Ch. 13- Article 13.1-3 Ch. 14- Articles 14.1-2, 14.4 – 5, 14.7- 11, 14.22-24 Ch. 15-Articles 15.2, 15.8, 15.11-12, 15.14 Ch. 18 - Table 18.1
4	Understand principles of producing components/products by forging process. Demonstrate forging process.	Forging – Demonstration of forging operations	T1-Ch.5, Art.5.1–5.17, T3- Vol. I Ch. 20 Article 20.4, 20.6-9, 20.20, 20.39,
5	Prepare engineering drawing of the development of funnel. Prepare a process sequence diagram. Use hand tools and cut sheet metal as per the development drawing. Prepare the plane pipe.	Sheet metal working applications. Hands on practice of Sheet metal working operations using hand tools- Preparation of Funnel.	T1- Ch. 6, Article 6.1 – 6.12, T3- Vol. I Ch. 26-Article 26.2-10, 26.15-16, 26.23 Ex. 8 on page 791
6	Understand the principle of GAS welding. Sketch and label a typical gas welding setup. Sketch the different types of flames used in gas welding. Identify practical applications of gas welding. Observe and Understand the process of GAS welding. Observe and Understand the operation of the equipment required for performing Gas welding. Distinguish between different flame types.	Gas Welding Demonstration of Gas Welding	T1- Ch. 9, Article 9.1 – 9.33, T3- Vol. I Ch. 24-Article 24.16-24, 24.27-28, Ex. 4 on Page 729
7	Understand the principle of Arc welding. Sketch and label a typical Arc welding setup. Sketch the different types of Welding Joints. Identify practical applications of Arc welding. Prepare a process sequence diagram. Marking on metal plates as per given drawing. Use hacksaw to cut raw material to required size.	Hands on practice of Joining of metal parts by Arc Welding-Preparation of a Lap Joint model.	T1- Ch. 9, Article 9.11-9.17, T3- Vol. I Ch. 24-Article 24.33-34, 24.36, 24.41-42, 24.71-72 Table 24.5 Ex. 1 on page 724

	Perform filing operation to prepare the two pieces to be joined. Select suitable electrode for striking the ARC. Perform ARC welding to produce Lap joint model.		
8	**Demonstrate the skills acquired.**	**Internal Examination**	
9	Understand the importance of joining processes and Identify their applications, Classify different joining processes, Understand the principle of arc welding, Identify different types of welded joints, Understand the purpose of edge preparation, Distinguish between different welding techniques. Prepare a process sequence diagram. Marking on metal plates as per given drawing. Use hacksaw to cut raw material to required size. Perform filing operation to prepare the two pieces to be joined. Select suitable electrode for striking the ARC. Perform ARC welding to produce Butt joint model.	Mechanical joining processes, Arc Welding Hands on practice of Joining of metal parts by Arc Welding- Preparation of a Butt Joint model.	T1- Ch. 9, 9.11-9.9.14, T3- Vol. I Ch. 24 Article 24.33-34, 24.36, 24.41-42, 24.71-72 Table 24.5 Ex. 2 on page 725
10	Identify tools used in carpentry section. Demonstrate the correct holding and use of carpentry tools including hand saw, C-clamp, Bench wise, Chisels, and Mallets. Classify different types of wood used in carpentry works, Identify common types of joints. Read and interpret given drawing of Lap Tee joint model. Prepare a process sequence diagram. Perform marking on the raw material. Prepare the required parts of Lap Tee joint. Produce the Lap Tee joint. Check for flatness and squareness of the parts prepared. Measure the dimensions of individual parts as well as the completed Lap Tee joint.	Introduction to wood working, Wood working Tools, Types of wood, Types of joints. Hands on practice of Wood working operations using hand tools- preparation of Lap Tee Joint.	T1- Ch. 7, Article 7.1-7.32, T3- Vol. I Table 9.1 Ch. 10 Article 10.2-8, 10.12, 10.23, 10.25
11	Define Brazing and Soldering processes, Differentiate between Welding, Brazing and Soldering, Identify practical examples of	Mechanical joining processes, Soldering, Brazing.	T1- Ch. 8, Article 8.1 – 8.25, T3- Vol. I Ch. 24-Article 24.65-66

	Brazing and soldering.		
12	Understand the salient construction details of machine tool like Shaping machine. Demonstrate shaping operations.	Machining – Demonstration of Shaping operations	T3- Vol. II Ch. 10-Article 10.2-4, 10.9, 10.29-34,
13	Prepare engineering drawing of Male & Female Joint. Prepare a process sequence diagram. Use hand tools and cut MS Flat as per the drawing.	Hands on practice of Fitting operations using hand tools- Prepare a job in fitting shop.	T1- Ch. 4, Article 4.1 – 4.27, T3- Vol. I Ch. 23-Article 23.2-5, 23.8, 23.11-17, 23.21
14	**Demonstrate the skills acquired**	**Internal Examination**	

Evaluation Scheme (Practical):

EC No.	Evaluation Component	Duration	Marks (100) (%)	Nature of Component
1.	Mid Term Test-I	2 hour	15	Open Book
2.	Mid Term Test-II	2 hour	15	Closed Book
3.	End Term Test	2 hour	40	Closed Book
4.	Attendance	Day to day	10	.....
5.	Continuous evaluation, Discipline, Punctuality, Assignment & Viva Voce	Day to day	20	.....

Chamber Consultation Hour: I operate an open door policy - if I am in, I will be glad to talk to you. However, I also have formal office hours so that you know when you can find me in: Thursday and Friday at 14:00 pm - 18:00 pm, or by appointment.

Notices: All notices concerning this course will be displayed on the Notice Board.

Make-up policy: Make-up is granted only for genuine cases with valid justification and prior permission from the Instructors.

(Instructor)

ENGINEERING GRAPHICS

Course Code	:	**CE101**
Course Title	:	**Engineering Graphics**
Course Credits	:	**2**
Total Hours per Week (L+T+P)	:	**0 + 0 + 3**
Instructor (s)	:	**Prof. Pradeep K. Gupta**

Course Description:

One hour lecture on various features of AutoCAD shall be dealt with in the theory hours on which the practice shall be performed in the last 2 hours of practical during a continuous 3 hours session every week. Hands-on practice shall be performed by each student on the individual PC assigned to him using the licensed AutoCAD 2012 installed on the PCs.

Scope & Objective:

Engineering drawing, drafting and graphics is the language of the engineers and technicians. Therefore, it is the intent of this course to equip students with the fundamentals of this unique language and to give them the skills necessary to prepare complete, concise, and accurate communications through engineering drawings using AutoCAD. The aim of this course is to introduce students the basic concepts and the use of engineering drawing with the help of AutoCAD. The students will develop an understanding of 2D computer aided drafting using AutoCAD.

Text Books:

T1. Kulkarni D M, Rastogi A P, Sarkar A K, Engineering Graphics with AutoCAD, PHI Learning Pvt. Ltd., New Delhi, India, Fourth Printing (Revised Edition), 2012.

T2. Bhatt N D, Engineering Drawing, Charotar Book Stall, Anand, India.

Reference Books:

R1 Jolhe D A, Engineering Drawing with an introduction to AutoCAD, TMH, New Delhi, India.

R2 Gill P S, Engineering Drawing (Geometrical Drawing), S K Kataria & Sons, Delhi, India.

Course Plan:

Week/ L. No	Learning Objectives	Topics to be covered	Reference Chap./ Sec. (Book)/Manual
1	Introduction to Engineering Drawing, AutoCAD and Its advantages	Introduction to Engineering Drawing & AutoCAD	T1 Ch1,2
2	Description of the Drawing screen and setting up Drawing, Getting Started with AutoCAD and initial setup commands	Drawing Setup, formatting	T1 Ch2
3	Introduction of the Draw toolbar like ARC, POLYLINE,ELLIPSE, RECTANGLE, POINTS, HATCH, TEXT Introduction to Modify Toolbar: MOVE,COPY,ROTATE,STRETCH ,TRIM,BREAK, EDIT POLYLINE,CHAMFER,EXPLODE Drawing different figure using above mentioned command	Basic Commands, Draw Toolbar	T1 Ch2 T2 Ch26
4	Practice on the modify and Draw toolbar	Advanced Command, Object & Modify toolbar	T1 Ch2 T2 Ch26
5	Introduction to different types of Planes of Projection, Practice of Projection of Simple objects like cube, rectangle etc. Introduction, terminology, dimension style, linear dimension, aligned dimension, angular dimension, radius & diameter dimension, angular dimension, base line dimension, Practice on the dimensioning	Orthographic Projection-I, Dimensioning	T1 Ch5 T2 Ch8

6	More examples for practice purpose is to be taken and the same must be done in AutoCAD .	Orthographic Projection-II	T1 Ch5 T2 Ch8
7	Different views of the complex objects to be drawn using AutoCAD	Orthographic Projection-III	T1 Ch2 T2 Ch26
8	Drawing a given 3D view into isometric Projection, Practicing 2D view of basic figures in AutoCAD	Isometric Projection-I	T1 Ch6 T2 Ch17 T1 Ch2 T2 Ch26
9	Drawing Isometric Projection From Orthographic Projection, Drawing 3D isometric view in AutoCAD	Isometric Projection-II	T1 Ch6 T2 Ch17
10	Practicing Isometric view in AutoCAD	Isometric Projection-III	T1 Ch2 T2 Ch26

Evaluation Scheme:

EC No.	Evaluation Component	Duration	Marks	Nature of Component
1.	Mid Term Test-I	1 hour	20	Closed Book
2.	Mid Term Test-II	1 hour	20	Closed Book
3.	End Term Test / Comprehensive	3 hour	40	Closed Book
4.	Assignment(s)/ Quizzes	30 min.	20	Open Book

Note: A total of 3 quizzes will be conducted. Out of these, the best performance will be considered for final evaluation.

Chamber Consultation Hour: 1 PM to 3 PM, All Mondays

Notices: All notices concerning this course will be displayed on the Notice Board.

Make-up policy: Make-up is granted only for genuine cases with valid justification and prior permission from the Instructors.

Instructors

INSTITUTE OF ENGINEERING AND TECHNOLOGY

The Second Semester courses of 4-year B Tech Programme (Common to all branches) have been thoroughly discussed and deliberated upon in the Faculty Council of Institute of Engineering and Technology of JKLU Jaipur for B Tech Batch of (2012-16) Recommended and forwarded for Approval.

20/07/2012

2012-16

Syllabus

B. Tech. Second Semester-2013

(COMMON TO ALL BRANCHES)

Approved for the Batch 2012-16.

Director-IET

Academic Section

21.7.2012

JK Lakshmipat University

Laliya Ka Vas, P.O. Mahapura, Ajmer Road, Jaipur 302 026

Ph.: +91-141-2168272/330/387/393

CONTENTS

PROFESSIONAL COMMUNICATION SKILLS

Course Code	:	**LA 201**
Course Title	:	**Professional Communication Skills**
Course Credits	:	**03**
Total Hours per Week	:	**2+0+2**

Course Syllabi (Theory):

- Introduction to the course. Characteristic Features of Effective Communication and Ways to Overcome Barriers to Communication.
- Importance of Non-Verbal Communication. Importance of Paralinguistic Features and Vocal Cues.
- Group Discussion. Job Interviews.
- Public Speaking.
- Business Letters and Resume.
- Business Reports, Technical Proposals.
- E-mail Writing, Other Business Writings.
- Editing and Proofreading.

Text Book: Sanjay Kumar and Pushp Lata, Communication Skills, New Delhi: OUP, 2011.

Reference Books:

1. Meenakshi Raman and Sangeeta Sharma, Technical Communication: Principles and Practice, Second Edition, New Delhi: OUP, 2011.
2. Krishna Mohan and Meenakshi Raman, Effective English Communication, New Delhi: Tata-McGraw Hill, 2000.
3. Krishna Mohan and N.P.Singh, Speaking English Effectively, New Delhi: Macmillan,1994.
4. V. Sasikumar and P.V. Dhamija, Spoken English: A Self-Learning Guide to Conversation Practice, Tata-McGraw Hill, 2007.

5. Norman Lewis, Word Power Made Easy, Delhi: GoyalSaab Publishers and Distributors, 1994.
6. A.J.Thomson and A.V.Martinet, A Practical English Grammar, 4th Edition, New Delhi: OUP, 1999.
7. Asha Kaul, Business Communication, Second Edition, New Delhi: PHI, 2010.
8. Edgar Thorpe and Showick Thorpe, Objective English, 2nd Edition, New Delhi: Pearson Education, 2008.

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (%)	Nature of Component
1.	Mid Term Test-I	1 hour	20	Closed Book
2.	Mid Term Test-II	1 hour	20	Open Book
3.	End Term Test / Comprehensive Exam	3 hour	40	Closed Book
4.	Quiz, Assignments, Mock Interviews, GDs, Presentations, etc	.....	20	Open/Closed Book

Course Syllabi (Practical):

- Sounds of English
- Accent and Intonation
- Listening Skills
- Reading Comprehension
- Vocabulary Extension
- Professional Presentations
- Group Discussions
- Job Interviews

Evaluation Scheme (Practical):

EC No.	Evaluation Component	Duration	Marks (100) (%)	Nature of Component
1.	Mid Term Test-I	2 hour	10	Closed Book
2.	Mid Term Test-II	2 hour	20	Closed Book
3.	End Term Test/Comprehensive Exam	2 hour	40	Closed Book
4.	Attendance	Day to day	10	.....
5.	Continuous evaluation, Discipline, Punctuality, Assignment & Viva Voce	Day to day	20	.....

ENGINEERING MATHEMATICS-II

Course Code	:	**MA201**
Course Title	:	**Engineering Mathematics - II**
Course Credits	:	**03**
Total Hours per Week (L+T+P)	:	**3+1+0**

Course Syllabi (Theory):

- **Ordinary Differential equation**: Differential equation of first order, Differential equation of higher order with constant coefficients, Differential equation of second order with variable coefficients, Solution in series
- **Partial differential equation**: Partial Differential Equations of First Order, Heat equation, wave equation, Laplace equation, Variable separable technique for solving PDE, Boundary value problems
- **Matrix Algebra**: Matrices, Rank of a Matrix, System of Linear Algebraic Equations, Linear Independence and Dependence, Eigen Values and Eigen Vectors, Diagonalization, Cayley Hamilton Theorem
- **Linear Algebra**: Unit Vector Space, Subspaces, Bases and Dimensions, Coordinates, Row Equivalence and Computations concerning Subspaces, Linear Transformations, The Algebra of Linear Transformations, Representation by matrices
- **3-Dimensional Geometry**: Equation of a sphere, Intersection of a sphere and a plane, tangent plane, Intersection of two spheres, orthogonality of two spheres, Right circular cone. Right circular cylinder

TEXT AND REFERENCE BOOKS

1. Dennis G. Zill and Warren S. Wright, *Advanced Engineering Mathematics*, Fourth Edition (Student Edition), Jones & Barlett, Viba, New Delhi, 2011
2. Peter V. O'Neil, *Advanced Engineering Mathematics*, Seventh Indian Reprint, Cengage Learning, New Delhi, 2011.
3. G.B. Thomas, Jr., *Thomas' calculus*, 11th edition (Indian), Pearson education, Delhi, 2008
4. Erwin Kreyszig, *Advanced Engineering Mathematics*, Wiley 9th Edition.
5. B.V.Ramana, *Higher Engineering Mathematics*, Tata Mcgra Hill.

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (%)	Nature of Component
1.	Mid Term Test-I	1 hour	20	Closed Book
2.	Mid Term Test-II	1 hour	20	Open Book
3.	End Term Test / Comprehensive Exam	3 hour	40	Closed Book
4.	Quiz, Assignments, Mock Interviews, GDs, Presentations, etc	.....	20	Open/Closed Book

ENGINEERING PHYSICS-II

Course Code	:	**PH201**
Course Title	:	**Engineering Physics - II**
Course Credits	:	**04**
Total Hours per Week (L+T+P)	:	**3+1+2**

Course Syllabi (Theory):

Application of Schrodinger Equations and Band Theory of Solids

- Particle in three-dimensional boxes, Degeneracy.
- Barrier penetration and tunnel effect, Tunneling probability, Alpha Decay.
- Kronig-Penny Model, Brillouin Zones, Effective Mass of Electrons, Distinction between Insulators, Semiconductors and Conductors, Intrinsic and Extrinsic Semiconductors.

Statistical Mechanics

- Introduction, Macroscopic and Microscopic Systems, Phase Space.
- Maxwell-Boltzman Statistics, Bose-Einstein Statistics, Fermi-Dirac Statistics.
- Sommerfeld Free Electron Gas Model of Solids.

Laser and Fibre Optics

- Theory of Laser Action, Einstein's Coefficients, Threshold Conditions for Laser Action.
- Theory, Design, and Applications of He-Ne Laser.
- Theory of Semiconductor Lasers.
- Optical Fibre, Numerical Aperture, and Maximum Angle of Acceptance.

Special Theory of Relativity

- Postulates of Special Theory of Relativity, Lorentz Transformations, Relativistic Velocity Addition.
- Relativity of Length, Mass, and Time, Mass-Energy Relation, Relativistic Energy and Momentum.

Nuclear Radiation Detectors

- Characteristics of Gas Filled Detectors, Constructions, Working, and Properties of Ionization Chamber.

- Proportional Counter, G.M. Counter, Paralysis Time, Quenching.
- Scintillation Counter.

Electro Dynamics

- Scalar and Vector fields, Definitions of Gradient, Divergence and Curl.
- Maxwell's Equations, Wave equation and its solution for free space, Poynting vector.

Text Books:

T1. G.D. Ladiwala and S. S. Sharma, "Engineering Physics-I" New Age International Publication, New Delhi, I edn. 2010.

T2. G.D. Ladiwala and S. S. Sharma, "Engineering Physics-II" New Age International Publication, New Delhi, I edn. 2010.

Reference Books:

R1 Arther Beiser, "Concept of Modern Physics" Tata McGrawHill, New Delhi, 5th edn. 1997.

R2 Ajoy Ghatak, "Optics", Tata McGraw Hill, 4th edn

R3 Eyvind H Wichman, "Quantum Physics" Tata McGraw Hill, Volume 4

R4 Neeraj Mehta, "Applied Physics for Engineers", PHI, I edn. 2011

R5: Dattu R Joshi, "Engineering Physics", Tata McGraw Hill, New Delhi, I edn. 2010

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (%)	Nature of Component
1.	Mid Term Test-I	1 hour	20	Closed Book
2.	Mid Term Test-II	1 hour	20	Closed Book
3.	End Term Test / Comprehensive	3 hour	40	Closed Book
4.	Assignment(s)/ Quizzes	30 min.	20	Open/Closed Book

Course Syllabi (Practical):

- To determine the height of water tank with the help of a Sextant.
- To determine the dispersive power of material of a Prism for Violet Red and Yellow colours of Mercury light with the help of a spectrometer.
- To determine the wave length of prominent lines of mercury by plane diffraction Grating with the help of spectrometer.
- To determine the ferromagnetic constants retentivity, permeability and susceptibility by tracing I-H curve using C.R.O.
- To study the Charge & Discharge of a condenser and hence determine time constant (Both current and voltage graphs are to be plotted).
- To determine the high resistance by method of leakage, using a Ballistic Galvanometer.
- To determine dielectric constant of a liquid using moving coil Ballistic Galvanometer.
- To study characteristics of G.M. Counting System.
- To determine the absorption coefficient of lead using lead sheet by G.M. Counting System.
- To verify the expression for the resolving power of a Telescope.
- To determine the specific resistance of the material of a wire by Carey Fosters Bridge.

Evaluation Scheme (Practical):

EC No.	Evaluation Component	Duration	Marks (100) (%)	Nature of Component
1.	Mid Term Test-I	2 hour	10	Closed Book
2.	Mid Term Test-II	2 hour	20	Closed Book
3.	End Term Test/Comprehensive Exam	2 hour	40	Closed Book
4.	Attendance	Day to day	10	.....
5.	Continuous evaluation, Discipline, Punctuality, Assignment & Viva Voce	Day to day	20	.....

ENGINEERING CHEMISTRY-I

Course Code	:	**CH 201**
Course Title	:	**Engineering Chemistry- II**
Course Credits	:	**04**
Total Hours per Week (L+T+P)	:	**(2 + 1 + 2)**
Total Hours per Week (L+T+P)	:	**3+1+2**

Course Syllabi (Theory):

- Methods & introduction of Coal
- Introduction of Solid state and structure of solids, Cubic system & Bragg's law
- Structure and properties of graphite, Liquid Crystal
- Introduction of Kinetics, Arrhenius theory, Gibbs law
- One component system
- Corrosion, Mechanism of corrosion
- Introduction of Nanotechnology
- Introduction of Optical fiber
- Introduction of Fuel

Text Books:

1. Engineering Chemistry by Jain & Jain, **Dhanpatrai publication**

Reference Books:

1- Engineering Chemistry by B Sivasankar, (Mc-Graw Hill publication).
2- Engineering Chemistry by O.G. Palanna, (Mc-Graw Hill publication).
3- Organic Chemistry by Smith, (Mc-Graw Hill publication).
4- Organic Chemistry by IL Finar, (Pearson)
5- Engineering Chemistry (Wiely India publication).

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (%)	Nature of Component
1.	Mid Term Test-I	1 hour	20	Closed Book
2.	Mid Term Test-II	1 hour	20	Closed Book
3.	End Term Test / Comprehensive	3 hour	40	Closed Book
4.	Assignment(s)/ Quizzes	30 min.	20	Open/Closed Book

Course Syllabi (Practical):

- Proximate analysis of solid fuel.
- Determination of calorific value of solid fuels.
- Measurement of pH of given sample by pH meter.
- Measurement of conductivity of given sample by conductivity meter.
- Measurement of Fluoride in water sample.
- To determine the strength of copper sulphate with the help of Hypo solution.
- To determine the strength of Ferrous Ammonium sulphate solution
- To determine the strength of NaOH and Na_2CO_3 in given alkali mixture
- Determination of Barium as barium sulphate gravimetrically.
- Determination of Na/K/Ca by Flame photometer in a given sample.

Evaluation Scheme (Practical):

EC No.	Evaluation Component	Duration	Marks (100) (%)	Nature of Component
1.	Mid Term Test-I	2 hour	15	Closed Book
2.	Mid Term Test-II	2 hour	15	Closed Book
3.	End Term Test	2 hour	40	Closed Book

4.	Attendance	Day to day	10	.....
5.	Continuous evaluation, Discipline, Punctuality, Assignment & Viva Voce	Day to day	20	.....

ELECTRICAL & ELECTRONICS ENGINEERING

Course Code	:	**EE201**
Course Title	:	**Electrical & Electronics Engineering**
Course Credits	:	**04**
Total Hours per Week (L+T+P)	:	**3+1+2**

Course Syllabi (Theory):

- Introduction to electrical circuits, Loop analysis, Node-voltage analysis
- Wye (Y) – Delta (Δ) and Delta (Δ) – Wye (Y) transformations
- Superposition theorem, Thevenin theorem
- Fundamental aspects of single phase ac supply, Phasor representation
- Steady state analysis of series circuits, Apparent, active and reactive power, power factor
- Three-phase supply and network, Measurement of three-phase power
- Basics of transformer, Practical single phase transformer, Auto transformer
- Rotating Electrical Machines, Introduction to Semiconductor
- Diode and its working, Applications of diodes
- Bipolar Junction Transistor, Transistor configuration

Text Books:

T_1: S.N.Singh "Basic Electrical Engineering", Prentice-Hall of India Pvt. Ltd, 2011.

T_2 J. Millman and C. Halkias, Integrated Electronics, McGraw Hill,2th Edition, 6th Indian Reprint, 2011

Reference Books:

R_1 T.K.Nagsarkar,M.S. Sukhija,"Basic Electrical Engineering", Oxford University press, 2nd edition, 2011.

R_2 A.S. Sedra and K.C. Smith, Microelectronic Circuits, Saunder's College Publishing, 1991.

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (%)	Nature of Component
1.	Mid Term Test-I	1 hour	20	Closed Book
2.	Mid Term Test-II	1 hour	20	Closed Book
3.	End Term Test / Comprehensive	3 hour	40	Closed Book
4.	Assignment(s)/ Quizzes	30 min.	20	Open/Closed Book

Course Syllabi (Theory):

ELECTRICAL LAB

1. Single line diagram of a power system and a distribution sub-station and basic functional study of main components used in power systems.
2. Make house wiring including earthing for 1-phase energy meter, MCB, ceiling fan, tube light,three pin socket and a lamp operated from two different positions. Basic functional study of components used in house wiring
3. Study the construction and basic working of ceiling fan, single phase induction motor and three phase squirrel cage induction motor. Connect ceiling fan along with regulator and single phase induction motor through auto-transformer to run and vary speed.
4. (a) Basic functional study and connection of moving coil & moving iron ammeters and voltmeters, dynamometer, wattmeter and energy meter.
   (b) Run a 3-phase squirrel cage induction motor at no load and measure its voltage, current,power and power factor. Reverse the direction of rotation.
5. Study the construction, circuit, working and application of the following lamps:
   (i) Fluorescent lamp, (ii) Sodium vapour lamp, (iii) Mercury vapour lamp, (iv) Halogen lamp and (v) Neon lamp
6. (a) Study the construction and connection of single phase transformer and auto-transformer.Measure input and output voltage and fin turn ratio.
   (b) Study the construction of a core type three phase transformer. Perform star and delta connection on a 3-phase transformer and find relation between line and phase voltage.

ELECTRONICS LAB

7. Identification, testing and applications of resistors, inductors, capacitors, PN-diode, Zener diode,LED, LCD, BJT, FET, UJT, SCR, Photo diode and Photo transistor.
8. (a) Functional study of CRO, analog & digital multi-meters and function / signal

generator.
(b) Study the single phase half wave and bridge rectifier and effects of filters on waveform.

9. Study the BJT amplifier in common emitter configuration. Measure voltage gain, plot gain frequency response and calculate its bandwidth.
10. (a) Study the construction and basic working of SCR.
(b) Study the single phase half wave and bridge controlled rectifier and observe the effect of firing angle on waveform.

Evaluation Scheme (Practical):

EC No.	Evaluation Component	Duration	Marks (100) (%)	Nature of Component
1.	Mid Term Test-I	2 hour	10	Closed Book
2.	Mid Term Test-II	2 hour	20	Closed Book
3.	End Term Test/Comprehensive Exam	2 hour	40	Closed Book
4.	Attendance	Day to day	10	.....
5.	Continuous evaluation, Discipline, Punctuality, Assignment & Viva Voce	Day to day	20	.....

ENGINEERING MECHANICS

Course Code	:	**ME 201**
Course Title	:	**Engineering Mechanics**
Course Credits	:	**3**
Total Hours per Week (L+T+P)	:	**3+1+0**

Course Syllabi (Theory):

- Fundamentals of engineering mechanics, Laws of Motion, Equilibrium, Conditions for equilibrium, Equations of equilibrium.
- Statics of Particles and Rigid Bodies: System of forces, Resultant force, Resolution of force, Moment and Couples.
- Trusses: Truss analysis, analysis of frames and machines.
- Friction: Types of Friction, Laws of friction, Angle of friction, Angle of repose, Applications of Friction.
- Lifting Machines: Mechanical advantage, Velocity Ratio, Efficiency of machine, Ideal machine, Ideal effort and ideal load, Reversibility of machine, Law of machine, Lifting machines; System of Pulleys, Simple wheel and axle, Wheel and differential axle, Weston's differential pulley block, Worm and worm wheel.
- Properties of Plane Surfaces: Centroids & Centre of Mass, area of moments, principle moments of inertia, Second moment of mass.
- Virtual work: Principle of Virtual Work, Active forces and active force diagram.
- Kinematics of Particles and Rigid Bodies: Velocity, Acceleration, Types of Motion, Equations of Motion, Rectangular components of velocity and acceleration, Angular velocity and Angular acceleration, Radial and transverse velocities and accelerations, Projectiles motion on plane and Inclined Plane, Relative Motion.
- Kinetics of Particles and Rigid Bodies: Equation of motion in rectangular coordinate, radial and transverse components, Equation of motion in plane for a rigid body.
- Work, Energy and Power: Work of a force, weight, spring force and couple, Power, Efficiency, Energy, Kinetic energy of rigid body, Principle of work and energy, Conservative and Non-conservative Force, Conservation of energy.
- Impulse and Momentum: Linear and angular momentum, Linear and angular impulse, Principle of momentum for a particle and rigid body, Principle of linear impulse and momentum for a particle and rigid body, Principle of angular momentum and Impulse, Conservation of angular momentum, Angular momentum of rigid body.

Reference Books:

R1. Vector Mechanics for Engineers, Beer and Johnston, Tata McGraw-Hill.

R2. Engineering Mechanics, Hibbeler, Pearson Education.

R3. Engineering Mechanics, Meriam and Kraige, John Wiley & Sons.

R4. Engineering Mechanics, Timoshenko and Young, Tata McGraw-Hill.

R5. Engineering Mechanics, Shames, Pearson Education.

R6. Engineering Mechanics, Boresi and Schmidt, CL-Engineering.

R7. Engineering Mechanics, Andrew Pytel & Kiusalas, Cengage Learning.

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (%)	Nature of Component
1.	Mid Term Test-I	1 hour	20	Closed Book
2.	Mid Term Test-II	1 hour	20	Closed Book
3.	End Term Test / Comprehensive	3 hour	40	Closed Book
4.	Assignment(s)/ Quizzes	30 min.	20	Open/Closed Book

MACHINE DRAWING

Course Code	:	**ME 241**
Course Title	:	**Machine Drawing**
Course Credits	:	**2**
Total Hours per Week (L+T+P)	:	**0+0+3**

Course Syllabi (Practical):

- SECTIONAL VIEWS: Conversion of pictorial view into sectional orthographic projections, sectional views with different types of sections such as revolved, broken aligned section missing views. Representation of those views with Auto-CAD
- ADVANCE ISOMETRIC VIEWS: Isometric view of complex objects and Machine Parts "Sectional Isometric Views" with AutoCAD
- Introduction to Oblique views and perspective projection and exploded views of an assembly using AutoCAD
- INTERSECTION OF SURFACE: Interpenetration of solids, prism and prism, cylinder and cylinder, cylinder and prism, cone and cylinder, cone and prism.
- LATEST ISI CONVENTIONS: Conventions covering the standard practice in machine drawing. Conventions for various components like bearing, gears, springs, key and key ways, threads, tap holes and materials. Working drawing for welded joints, Use of specifications for limits, fits and tolerances, Conventions used for surface roughness i.e. Machined surface, rough surface, etc. Bearing and bearing mountings, Engine and machine tool components.

Text Books:

T1. Yarwood, Alf. **"Introduction to Auto – CAD 2011 2D and 3D Design"**, Elsevier, 1st edition, 2010

T2. Ellen Finkelstein, **"Auto-CAD 2011 & Auto-CAD LT 2011 Bible,"** Wiley India Edition

T3. Ajeet Singh, **"Machine Drawing: Includes AutoCAD,"** TMH, 2nd edition

Reference Books:

R1 Bhatt, N.D. "**Machine Drawing**", Charotar Pulisher, 38th edition, 2003.

R2 James E Fuller, **"Using Auto-CAD,"** Denmark Publishing Co.

R3 Dhawan, R.K. "**Machine Drawing**", S. Chand and Co, 2005

R4 Radhakrishnan, P., "**Computer Graphics and Design**", Dhanpatrai and Sons.

Evaluation Scheme (Practical):

EC No.	Evaluation Component	Duration	Marks (100) (%)	Nature of Component
1.	Mid Term Test-I	2 hour	10	Closed Book
2.	Mid Term Test-II	2 hour	20	Closed Book
3.	End Term Test/Comprehensive Exam	2 hour	40	Closed Book
4.	Attendance	Day to day	10	.....
5.	Continuous evaluation, Discipline, Punctuality, Assignment & Viva Voce	Day to day	20	.....

Having been recommended by BoS and approved by Academic Council, the Syllabus and Scheme of Examination are approved for implementation.

Vice Chancellor

JK Lakshmipat University

Laliya Ka Vas, P.O. Mahapura, Ajmer Road, Jaipur 302 026

Ph.: +91-141-2168272/330/387/393

INSTITUTE OF ENGINEERING AND TECHNOLOGY

4 Year B. Tech Program

Branch: Electrical Engineering

Batch 2012-16

SEMESTER – III to VIII

Detailed Syllabus

&

Scheme of Examination

Academic Council Meeting (20.04.13)

JK Lakshmipat University

Laliya Ka Vas, P.O. Mahapura, Ajmer Road, Jaipur 302 026

Ph.: +91-141-2168272/330/387/393

INSTITUTE OF ENGINEERING AND TECHNOLOGY

4 Year B. Tech Programme

(Branch: Electrical Engineering)

Batch 2012-2016

SEMESTER-THIRD

Detailed Syllabus

&

Scheme of Examination

Academic Council (20.04.2013)

NETWORK ANALYSIS & SYNTHESIS

Course Code	:	**EE301**
Course Title	:	**Network Analysis & Synthesis**
Course Credits	:	**5.5**
Total Hours Per Week (L+T+P)	:	**3+1+0**

Course Syllabi (Theory):

- RLC parameter, Independent and dependent sources, Voltage/current relationship for individual element, source transformation techniques, KCL, KVL for network having both Independent and dependent sources
- Superposition, Thevenin and Norton Theorem, Maximum power transfer & Reciprocity theorem, Series and parallel resonant circuits and Q-factor, Mutual inductance ,Dot Convention and coupled circuits, Graph of a network ,Concept of tree Co-tree, Tieset, Cut-set, Incidence matrix, Tie-se matrix, Cut-set matrix
- Formulation and solution of network equilibrium equations on loop and node basis, Introduction to Laplace Transform, Laplace transform of some basic functions, Laplace transform of periodic functions, Inverse Laplace transform, Solve first and second order equation, Application of Laplace transform: Circuit Analysis for RL, RC &,RLC Circuits, Time Constant
- Voltage & current ratio of two port network, Admittance, impedance, hybrid and transmission parameter of two port networks, Conversion of one parameter to another parameter, Condition of reciprocity & symmetry
- Series, parallel and cascade connection of two port networks, Network reliability, Hurwitz Polynomials, , Positive real functions, Properties of RC, RL & LC networks, Foster and Cauer forms of RC, RL & LC networks

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40
4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Text Books/ Reference Books:

T1. K.M.Soni, "Circuit & Systems" S.K.Kataria & Son , Eight Edition, 2008.

R1 Roy Choudhary, "Network Theory", TMH, 3rd Edition, 2004

R2 M.E Van Valkenburg, "Network Analysis" , PHI, 3rd Edition, 2002.

ELECTRICAL MACHINES - I

Course Code	:	**EE302**
Course Title	:	**Electrical Machines-I**
Course Credits	:	**5.5**
Total Hours per Week (L+T+P)	:	**3+1+0**

Course Syllabi (Theory):

Review of Electric Circuit Theory: Introduction, DC and AC Analysis, Three phase Circuits, Power and Impedance Measurements

Review of Basic Laws of Electromagnetisms: Introduction, Maxwell's Equations, Magnetic materials and Their Properties, Magnetic Circuits, Self- and Mutual Inductances, Magnetically Coupled Coils, Magnetic Losses.

Transformers: Introduction, Construction of a Transformer, An Ideal Transformer, A Noni deal Transformer Voltage Regulation, Maximum Efficiency Criterion, Determination of Transformer Parameters, Per-Unit Computations, The Autotransformer, Three-Phase Transformers, The Constant-Current Transformer, Instrument Transformers.

Direct-Current Generators: Introduction, Mechanical Construction, Armature Windings, Induced EMF Equations, Developed Torque, Magnetization Characteristic of a DC Machine, Theory of Communication, Armature Reaction, Types of DC Machines, Voltage Regulation , Losses in DC Machines, A Separately Excited DC Generator, A Shunt Generator, A Series Generator ,Compound Generators ,Maximum Efficiency Criterion.

Direct-Current Motors: Operation of a DC Motor, Speed Regulation, Losses in a DC Motor, Series Motor, Shunt Motor, The Compound Motor, Methods of Speed Control, The WardLeonard System, Torque Measurements, Braking or Reversing DC Motors.

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*

1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40
4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Text Books/ Reference Books:

T1. Nagrath I.J.and Kothari D.P, "Basic Electrical Engineering" TMH, Third Edition 2011.

T2. B. L. Theraja, "A Text Book on Electrical Technology" S.Chand, VolumeII. 2012.

R1 Electrical Engineering - Principles and Applications, Allan R. Hambley, PHI,fourth edition- 2007.

ELECTRONIC DEVICES & CIRCUITS

Course Code	:	**ECE301**
Course Title	:	**Electronics Devices & Circuits**
Course Credits	:	7
Total Hours per Week (L+T+P)	:	3+1+2

Course Syllabi (Theory):

- **Semiconductor Physics:** Mobility and conductivity, charge densities in a semiconductor, Fermi Dirac distribution, carrier concentrations and Fermi levels in semiconductor, Generation and recombination of charges, diffusion and continuity equation, Mass action Law, Hall effect.
- **Junction Diode:** PN Junction diodes, Diode as a circuit element, load line concept, clipping and clamping circuits, Voltage multipliers. Zener diode, characteristics and its applications.
- **Bipolar Junction Transistor:** Transistor characteristics, Current components, Current gains: alpha and beta. Operating point. Hybrid model, h-parameter equivalent circuits. CE, CB and CC configuration. DC and AC analysis of CE, CC and CB amplifiers. Ebers-Moll model. Biasing & stabilization techniques. Thermal runaway, Thermal stability.
- **Small Signal Amplifiers at Low Frequency:** Analysis of BJT and FET, DC and RC coupled amplifiers. Frequency response, mid-band gain, gains at low and high frequency. Analysis of DC and differential amplifiers. Miller's Theorem. Cascading Transistor amplifiers, Darlington pair. Emitter follower, source follower.
- **Field Effect Transistor** JFET, MOSFET, Equivalent circuits and biasing of JFET's & MOSFET's. Low frequency CS and CD JFET amplifiers. FET as a voltage variable resistor. Biasing, Small signal model analysis.

Course Syllabi (Practical):

1. Plot V-I characteristic of P-N junction diode & calculate cut-in voltage, reverse saturation current and static & dynamic resistances.
2. Plot V-I characteristic of Zener diode and study of Zener diode as voltage regulator. Observe the effect of load changes and determine load limits of the voltage regulator.
3. Study of application of diode as clipper & clamper circuit.
4. Plot input and output characteristics of BJT in CB, CC and CE configurations.
5. Plot frequency response curve for single stage amplifier and to determine gain bandwidth product.
6. Plot drain current-drain voltage and drain current-gate bias characteristics of field effect transistor and measure of I_{DSS} & V_P.
7. Plot gain-frequency characteristic of two stages RC coupled amplifier & calculate its bandwidth and compare it with theoretical value.

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40
4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Evaluation Scheme (Practical):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test	2 hour	20
2.	End Term Test	2 hour	40

3.	Class Participation and/or Attendance	Day to day	15
4.	Additional Continuous Evaluation (Assignments, Discipline, Punctuality, & Viva Voce)	Day to day	25

***Note: The ratio of weightage between Theory and Practical content will be (60%: 40% respectively)**

Text Books:

TB-1: Microelectronics Circuits (Theory and Applications), Adel S. Sedra and Kenneth C. Smith, Adapted by Arun N. Chandorkar, 5th Ed. Oxford International Student Edition.

TB-2: Electronic Device and Circuits, J.B. Gupta, Katson Educational Series.

TB-3: Electronic Devices and Circuits, David A. Bell, Oxford 5th Edition.

Reference Books:

RB-1 Millman's Electronic Devices and Circuits, Jocob Millman, Christos C Halkias & Satyabrata Jit, Tata Mc-Graw Hill 3rd Edition.

RB-2 Electronic Devices and Circuit Theory, Robert L. Boylestad and Louis Nashelsky, Pearson 10th Edition.

RB-3 Electronic Devices and Circuits, S. Salivahanan, N. Suresh Kumar and A Vallavaraj, Tata Mc-Graw Hill 2rd Edition.

MEASUREMENTS & INSTRUMENTATION

Course Code	:	**ECE 302**
Course Title	:	**Measurements & Instrumentation**
Course Credits	:	**5.5**
Total Hours Per Week (L+T+P)	:	**3+0+2**

Course Syllabi (Theory):

- **Introduction of Measurements and Theory of Error:** Significance of measurements, different methods of measurements, Instruments used in measurements, Elements of a Generalized Measurement System. Characteristics of instruments, Errors analysis, Types of Error, Significant figures.
- **Introduction of DC and AC Bridges:** Wheatstone Bridge, Kelvin Double Bridge, Maxwell's Bridge, and Hay's Bridge. Sources of errors in Bridges and their elimination by shielding and grounding.
- **Digital Instruments:** Advantages of digital over analogue processing. Techniques of converting Digital to Analogue (D/A) and Analogue to Digital (A/D). Digital Voltmeter.
- **Transducers:** Definition, Classification, Selection Criteria, Principle, Resistive Transducer (Strain Gauge, Thermistor and RTD), Capacitive, Piezoelectric, Thermocouple and Inductive, LVDT transducer, Application of above transducers.
- **Display Devices and Recorders:** Classification of display devices and systems. Cathode Ray Tube, LED, LCD and Recorders.

Course Syllabi (Practical):

- To study Anderson Bridge
- To Study Wien Bridge Oscillator trainer

- To study Maxwell's Capacitance & Inductance Bridge
- To study Solar Energy Trainer with built in Voltmeter & Ammeter.
- To study Ultrasonic transducer Trainer
- Displacement measurement using LVDT
- Temperature measurement using RTD, Thermistors, Thermocouple, Thermometers, Calibration.
- To study Bench top LCR meter
- Force measurement using Strain Gauges and Load Cells
- Measurement of earth resistance by fall of potential method
- To study the working of Spectrum analyzer and determine the bandwidth of different signals.

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40
4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Evaluation Scheme (Practical):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*

1.	Mid Term Test	2 hour	20
2.	End Term Test	2 hour	40
3.	Class Participation and/or Attendance	Day to day	15
4.	Additional Continuous Evaluation (Assignments, Discipline, Punctuality, & Viva Voce)	Day to day	25

***Note: The ratio of weightage between Theory and Practical content will be (60%: 40% respectively)**

Text Books:

1. Cooper & Helfrick, "Modern Electronic Instrumentation and Measurement Techniques", PHI.
2. A.K.Sawhney, "A Course in Electrical and Electronics Measurements and Instrumentation", Dhanpat Rai & Sons

Reference Books:

1. H. S. Kalsi, "Electronic Instrumentation", TMH.
2. Thomas and Clark, "Handbook of Electronic Instruments and Measurement Techniques", PHI

ENGINEERING MATHEMATICS - III

Course Code	:	**MA301**
Course Title	:	**Engineering Mathematics – III**
Course Credits	:	**5.5**
Total Hours per week (L+T+P)	:	**3+1+0**

Course Syllabus:

- **Integral Transforms**: Laplace transform and its properties, Fourier Transform, Integral transform method for solving differential equations, Systems of Linear Differential Equations, Discrete Fourier transform, Fast Fourier Transform
- **Special Functions**: Legendre and Bessel functions, series representations and recurrence relations
- **Calculus of variations**: Extremal function, Euler Equation, Isoperimetric problems
- **Complex Analysis**: Functions of complex variables and its derivatives, Integration in complex planes, Series, Singularities and Residues, Evaluation of Real Integrals, Conformal mappings, Schwarz-Christoffel Transformations.

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40
4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	---	10

Text And Reference Books

1. Dennis G. Zill and Warren S. Wright, *Advanced Engineering Mathematics*, Fourth Edition (Student Edition), Jones & Barlett, Viba, New Delhi, 2011
2. Peter V. O'Neil, *Advanced Engineering Mathematics*, Seventh Indian Reprint, Cengage Learning, New Delhi, 2011.
3. Erwin Kreyszig, *Advanced Engineering Mathematics*, Wiley 9th Edition.
4. B. S. Grewal, Higher Engineering Mathematics, 41st Ed., Khanna Publishers, Delhi, 2011.
5. B. V. Ramana, *Higher Engineering Mathematics*, Tata Mcgraw Hill.
6. Potter M.C., Goldberg J.L., Edward F.A., *Advanced Engineering Mathematics*, 3rd Edition, Oxford University Press, 2005

FOUNDAIONS OF MANAGEMENT

Course Code	:	**HS301**
Course Title	:	**Principles of Management**
Course Credits	:	**4**
Total Hours Per Week (L+T+P)	:	**3+0+0**

Course Syllabi (Theory):

- **Concepts of management:** Functions and Responsibilities of managers, Principles of management and visiting various, Schools of management Thoughts in developing, Excellent managers
- **Planning:** Nature and purpose of planning, Planning process and principles, Types of planning, Advantages and disadvantages of planning, Concept of objectives and types of objectives, Case analysis
- **Organizing:** Nature and purpose of organizing, Process of organizing, Span of management and determination of span of management, Principles of organizing, Departmentalization, delegation and, Decentralization. Case analysis
- **Directing and leading:** Requirements of Effective directions, Giving orders, motivation, Nature of leadership, leadership and management, Recapitulation and case discussion
- **Controlling:** concept and process, Need for controlling and types of control methods, Essentials of effective control, Benefits and problems in control systems. Case analysis
- Social responsibilities of business: Meaning, Social responsibility of business towards different groups, Social performance of business in India, Social audit, Business ethics and corporate governance

Evaluation Scheme (Theory):

Sr. No.	Evaluation Component	Duration	Marks (100) (%)
1.	Mid Term Exam	2 hours	20%
2.	End Term Exam	3 hours	50%
3.	Continuous Evaluation (Quizzes, Assignments, Presentations, Class Participation)	-	30%

Text Books/ Reference Books:

T1. Tripathy, P.C. and Reddy, P. N. "Principles of Management". . McGraw Hill, New Delhi. 4th ed. 2008.

R1 Koontz, Herold and Weihrich, Heinz. "Management". McGraw Hill, New York. 9th ed. 1988.

R2 Stoner, James A. F. and Freeman, R Edward. "Management". Prentice Hall of India, New Delhi. 6th e, 1989.

R3 Bateman, T. S. and Snell, S. A. "Management: Leading and Collaborating in a Competitive World", McGraw Hill Irwin. 8th edition,2009.

R3 Draft, R. L. "Principles of Management". Cengage learning.2009

R4 Schermerhron, J. R. "Introduction to Management", 10th edition, Wiley India. 2009

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INSTITUTE OF ENGINEERING AND TECHNOLOGY

4 Year B. Tech Programme

(Branch: Electrical Engineering)

Batch 2012-2016

SEMESTER-FOURTH

Detailed Syllabus

&

Scheme of Examination

Academic Council (20.04.2013)

ELECTRICAL MACHINES–II

Course Code	:	**EE401**
Course Title	:	**Electrical Machines–II**
Course Credits	:	**07**
Total Hours per Week (L+T+P)	:	**3+1+2**

Course Syllabi (Theory):

Three phase induction motor: Basic theory and construction of squirrel-cage and wound-rotor motors; equivalent circuit; measurement of equivalent circuit parameters, Synchronous Speed, speed of rotor field, slip, Various methods of measurement of slip, starting & running torque, analysis of machine equations, speed/torque curves, maximum torque, effect of change in voltage & frequency on torque, speed & slip, circle diagram, no load & block rotor tests. Starting and speed control methods, cascaded connection, Braking, Effect of rotor resistance. Cogging, Crawling. Double cage squirrel cage induction motor, induction generator, induction regulator.

Single-Phase Induction Motor: Double revolving field theory, equivalent circuit, no load & block rotor tests, starting methods. Outline of shaded-pole, universal, permanent magnet, and reluctance machines with applications.

Alternator: Basic concepts, types and construction, generated emf, distribution & Pitch factor, armature reaction; phasor diagram; synchronous reactance; equivalent circuit, open and short-circuit characteristics, voltage regulation, OC & SC tests, zero power factor characteristics, potier triangle and ASA method of finding voltage regulation, synchronization, hunting phenomena.

Synchronous Motors: Types, construction, principle, phasor diagrams, speed torque characteristics, power factor control, V-curves, starting methods, performance calculations, applications, synchronous condenser, synchronous induction motor.

Course Syllabi (Practical):

1. Speed control of D.C. shunt motor by (a) Field control method & plot the curve for speed vs field current. (b) Armature control method & plot the curve for speed vs armature voltage.
2. Speed control of a D.C. Motor by Ward Leonard method and to plot the curve for speed vs. applied armature voltage.
3. To determine the efficiency of D.C. Shunt motor by loss summation (Swinburne's) method.
4. To perform O.C. and S.C. test on a 1-phase transformer and to determine the parameters of its equivalent circuit.
5. To perform back-to-back test on two identical 1-phase transformers and find their efficiency & parameters of the equivalent circuit.
6. To perform parallel operation of two 1-phase transformers and determine their load sharing.
7. To perform OC & SC test on a 3-phase transformer & find its efficiency and parameters for its equivalent circuit.
8. To perform parallel operation of two 3-phase transformer and determine their load sharing.
9. To plot OCC & SCC of an Alternator and to determine its regulation by synchronous impedance method.
10. To perform no load and blocked rotor test on a three phase induction motor to determine the parameters of its equivalent circuits.

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20

2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40
4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Evaluation Scheme (Practical):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test	2 hour	20
2.	End Term Test	2 hour	40
3.	Class Participation and/or Attendance	Day to day	15
4.	Additional Continuous Evaluation (Assignments, Discipline, Punctuality, & Viva Voce)	Day to day	25

***Note: The ratio of weightage between Theory and Practical content will be (60%: 40% respectively)**

Text / Reference Books:

1. Electric Machinery and Transformers-Bhag S. Guru,Huseyin R. Hiziroglu-Oxford Publication
2. Electrical Technology Vol II. B. L. Theraja,S .Chand Publications
3. Electrical Machines. By Nagarath & Kothari,TMH Publications
4. Electrical Machines by P S Bhimbra- Khanna Publishers.
5. Electrical Technology Vol II. B. L. Theraja,S .Chand Publications

TRANSMISSION & DISTRIBUTION OF ELECTRICAL POWER

Course Code	:	**EE402**
Course Title	:	**Transmission & Distribution of Electrical Power**
Course Credits	:	**5.5**
Total Hours per Week (L+T+P)	:	**3+1+0**

Course Syllabi (Theory):

Introduction of supply system: Structure of electric power system: generation, transmission and distribution; Types of AC and DC distributors, distributed and concentrated loads , interconnection HVDC and EHV AC transmission

Mechanical Design of overhead lines: Material and types of conductor. Conductor arrangements and spacing, Mechanical design of transmission line between towers, sag and tension calculations for supports at same & different levels using approximate equations taking into account the effect of ice and wind, stringing chart and sag template, Conductor vibrations and vibration dampers.

Transmission Line Parameters :Parameters of resistance, inductance and capacitance calculations ,single and three phase transmission lines, single and double circuits ,Solid, stranded and bundled conductors, Symmetrical and unsymmetrical spacing ,transposition of lines Concepts of GMR and GMD , Skin and proximity effects, interference with neighboring communication circuits. Skin and proximity effects.

Modeling and Performance of Transmission Lines :Classification of lines: Short line, medium line and long line; equivalent circuits, attenuation constant, phase constant, surge impedance; transmission efficiency and voltage regulation; real and reactive power flow in lines: Power-angle diagram; shunt and series compensation; Ferranti effect and corona loss.

Insulators and Cables : Insulators: Types, voltage distribution in insulator string and grading, improvement of string efficiency. Underground cables: Introduction-Types of cables,

Capacitance of Single-core cable, Grading of cables, Power factor and heating of cables, Capacitance of 3- core belted cable, D.C cables

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40
4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Text / Reference Books:

1. C.L.Wadhwa,"Electrical Power System", New age international publisher.
2. V.K.Mehta, Rohit Mehta" Principles of Power System", S.Chand Publications.
3. William H.Kersting, "Distribution system modeling and analysis", CRC press publication .
4. J.B.Gupta "Transmission & Distribution of Electrical Power", S.K.Kataria & Sons publication.
5. Soni, Gupta, Bhatnagar "Electrical Power System."Dhanpat Rai & Sons.

DIGITAL ELECTRONICS

Course Code	:	**ECE402**
Course Title	:	**Digital Electronics**
Course Credits	:	**5.5**
Total Hours per Week (L+T+P)	:	**3+0+2**

Course Syllabi (Theory):

- Digital system and binary numbers: Signed binary numbers, binary codes, cyclic codes, error detecting and correcting codes, hamming codes.
- Gate-level minimization: The K-map method up to five variable, don't care conditions, POS simplification, NAND and NOR implementation, Quine Mc-Clusky method (Tabular method)
- Combinational Logic: Combinational circuits, analysis procedure, design procedure, binary adder-subtractor, decimal adder, binary multiplier, magnitude comparator, decoders, encoders, multiplexers ,demultiplexers
- Synchronous Sequential logic: Sequential circuits, storage elements: latches, flip flops, analysis of clocked sequential circuits, state reduction and assignments, design procedure.
- Registers and counters: Shift registers, ripple counter, synchronous counter, other counters.
- Memory and programmable logic: RAM, ROM, PLA, PAL. Design at the register transfer level: ASMs, design example, design with multiplexers. Asynchronous sequential logic: Analysis procedure, circuit with latches, design procedure, reduction of state and flow table, race Free State assignment, hazards.

Course Syllabi (Practical):

1. Study of logic gates.
2. Design and implementation of adders and subtractors using logic gates.
3. Design and implementation of code converters using logic gates.

4. Design and implementation of 4-bit binary adder/subtractor and BCD adder using IC 7483.
5. Design and implementation of 2-bit magnitude comparator using logic gates, 8-bit magnitude comparator using IC 7485.
6. Design and implementation of 16-bit odd/even parity checker/generator using IC 74180.
7. Design and implementation of multiplexer and demultiplexer using logic gates and study of IC 74150 and IC 74154.
8. Design and implementation of encoder and decoder using logic gates and study of IC 7445 and IC 74147.
9. Construction and verification of 4-bit ripple counter and Mod-10/Mod-12 ripple counter.
10. Design and implementation of 3 bit synchronous up/down counter.
11. Implementation of SISO, SIPO, PISO and PIPO shift registers using flip-flops

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40
4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Evaluation Scheme (Practical):

EC No.	Evaluation Component-	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test	2 hour	20
2.	End Term Test	2 hour	40
3.	Class Participation and/or Attendance	Day to day	15
4.	Additional Continuous Evaluation (Assignments, Discipline, Punctuality, & Viva Voce)	Day to day	25

***Note: The ratio of weightage between Theory and Practical content will be (60%: 40% respectively)**

Text Books:

1. M. Morris Mano and M. D. Ciletti, "Digital Design", 4th Edition, Pearson Education

2. Pedroni - Digital Electronics & Design, Elsevier

Reference Books:

1. F. Vahid: Digital Design: Wiley Student Edition, 2006

2. J. F. Wakerly, Digital Design Principles and Practices, Fourth Edition, Prentice-Hall, 2005.

3. R. L. Tokheim, Digital electronics, Principles and applications, 6th Edition, Tata McGraw Hill Edition.

ELECTROMAGNETIC FIELD THEORY

Course Code	:	**ECE403**
Course Title	:	**Electromagnetic Field Theory**
Course Credits	:	**5.5**
Total Hours per Week (L+T+P)	:	**3+1+0**

Course Syllabi (Theory):

- **Introduction:** Scalar and Vector fields, Physical meaning of gradient, divergence and curl, co-ordinate systems, review of electrostatic and magnetostatic fields.
- **Time varying fields and Maxwell's equations:** Faraday's law, current continuity equation, displacement current, Maxwell's equations, electromagnetic boundary conditions.
- **Electromagnetic waves:** Wave equations and their solutions for free space conditions, electromagnetic potentials, uniform plane waves, wave equations for a conducting medium, losses, skin depth, sinusoidal time variations, wave propagation in dielectrics and conductors, polarization, reflection and refraction, Poynting vector and the flow of power.
- **Electromagnetic radiation:** Radiation from a current element in free space, Quarter and half wave antenna, Electromagnetic interference and electromagnetic compatibility

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40

4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Text Book: Principles of Electromagnetics, N. O. Sadiku ; Oxford Univ. Press, 4th Ed

Reference Books:

1.Engineering Electromagnetics, Hayt and Buck;TMH,7th Ed

2.Fundamentals of applied electromagnetics, F.T. Ulaby;PHI,5th Ed

3.Introduction to electrodynamics,D.J. Griffiths;PHI.

NUMERICAL & STATISTICAL ANALYSIS

Course Code	:	**MA 402**
Course Title	:	**Numerical & Statistical Analysis**
Course Credits	:	**5.5**
Total Hours per Week (L+T+P)	:	**3 + 0 + 2**

Course Syllabi (Theory):

- **Modeling, Computers, and Error Analysis**: Mathematical Modeling and solution using Programming and Software, Computer Arithmetic and Errors: Approximations and Round-Off Errors, Truncation Errors and the Taylor Series
- **Transcendental and polynomial equation**: Solution of non-linear Equations: Bracketing Methods, Open Methods, Roots of Polynomials
- **Linear Algebraic Equations**: LU Decomposition and Matrix Inversion, Iterative methods for solving system of linear equations.
- **Interpolation and approximation**: Interpolation for equally and unequally spaced points, Lagrangian Polynomial, Curve Fitting: Least-Squares Regression
- **Numerical Differentiation and Integration**: Numerical Differentiation and Integration, Newton-Cotes Integration Formulae.
- **Ordinary Differential Equations**: Single step methods for solving first order ordinary differential equation
- **Random Variables and probability distributions**: Introduction to probability, Discrete and continuous random variables, probability mass, probability density and cumulative distribution functions, Mathematical expectation, Chebyshev's inequality, Discrete and continuous probability distributions
- **Sampling distributions**: Sampling, Types of sampling, sampling errors, sampling distribution of means, variance and proportions for normal population, The Central Limit Theorem, Chi-Square, t and F distributions
- **Estimation**: Estimators, Point and interval estimation, confidence intervals for parameters in one sample and two sample problems of normal populations, confidence intervals for proportions
- **Testing of Hypotheses**: Null and alternative hypotheses, the critical and acceptance regions, two types of error, Parametric and Non-parametric tests, Chi-square goodness of fit test, Contingency tables.

- **Correlation and regression**: Types of Relationships, Scatter Diagrams, Regression Line, Coefficients of Determination and Correlation.
- **Analysis of variance**: One way analysis of variance, experimental design, two way analysis of variance without interaction

Course Syllabus (Practical):

Computer Programming in C and Matlab; Introduction to SPSS for solving statistical techniques.

1. To find the solution of Non-linear equations.
2. To find solution of system of equations.
3. To find the best fitted curve for a given set of points.
4. To differentiate a function numerically.
5. To integrate a functions numerically.
6. To find solution of a differential equation numerically.
7. Working on SPSS

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40
4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	---	10

Evaluation Scheme (Practical):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test	2 hour	20
2.	End Term Test	2 hour	40
3.	Class Participation and/or Attendance	Day to day	15
4.	Additional Continuous Evaluation	Day to day	25

	(Assignments, Discipline, Punctuality, & Viva Voce)		

Note: The ratio of weightage between Theory and Practical content will be (60%: 40% respectively)

Text and Reference books:

1. K. E. Atkinson, *Introduction to Numerical Analysis*, John Wiley and Sons.
2. M.K. Jain, S. R. K. Iyengar, R. K. Jain, *Numerical Methods For Scientific And Engineering Computation*, New age International publishers, New Delhi.
3. Steven C Chapra, Raymond P Canale, *Numerical Methods for Engineers*, 6/e, Mc Graw Hill
4. Srimanta Pal, *Numerical Methods: Principles, Analyses and Algorithms*, Oxford University Press, New Delhi.
5. Cheney and Kincaid, *Numerical Methods and Applications*, Cengage Publications, New Delhi.
6. Cleve B. Moler, *Numerical Computing with MATLAB*, Prentice Hall of India, New Delhi
7. Rishard A. Johnson, *Miller and Freund's probability and Statistics for Engineers*, PHI, 8th Ed.
8. Ravichandran J., Probaility and statistics for Engineers, Wiley India, New Delhi.
9. Douglas C. Montgomery and George C. Runger, *Applied Statistics and Probability for Engineers*, John Wiley & Sons, Inc., 3rd Edition (2004).
10. Prem S. Mann, *Introductory Statistics*, Wiley publication, 7th edition.

PRINCIPLES OF ECONOMICS

Course Code	:	**HS401**
Course Title	:	**Principles of Economics**
Course Credits	:	**4**
Total Hours per Week (L+T+P)	:	**3 + 0 + 0**

Course Syllabi (Theory):

- Definition of Economics and role of economics in Engineering and Technology; Basic economic terms; The economy, working of an economy, kinds of an economy and its basic problems; Laws of Demand and Supply and market Equilibrium; Elasticity of demand its measurements and application, Production function and law of Variable Proportion and Law of Returns to Scale; Concepts of cost and revenue, short run and long run cost function; Profit maximization hypothesis, Price and output determination under Perfect Competition, Monopolistic competition and Monopoly.
- Measurement of macroeconomic aggregates, National Income, Consumption, saving and investment function; Macroeconomic issues: Inflation, Unemployment and Economic growth International aspects of macro economics; Foreign Exchange rate and Balance of payments.

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40

4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Text Book:

T.R. Jain and M.L. Grover, "Economics for Engineers", V. K. (India) Enterprises

Reference Books:

- D N Dwivedi "Principles of Economics", Vikas Publishing House Pvt Ltd.
- G. Mankiew. Economics Principles and Applications. Cengage Learning

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INSTITUTE OF ENGINEERING AND TECHNOLOGY

4 Year B. Tech Programme

(Branch: Electrical Engineering)

Batch 2012-2016

SEMESTER-FIFTH

Detailed Syllabus

&

Scheme of Examination

Academic Council (20.04.2013)

LINEAR CONTROL SYSTEMS

Course Code	:	**EE 501**
Course Title	:	**Linear Control Systems**
Course Credits	:	**7**
Total Hours per Week (L+T+P)	:	**3+1+2**

Course Syllabi (Theory):

Control System Components and Transfer Function
System concept, open loop and closed loop systems, mathematical modeling of mechanical and electrical systems, Transfer function of linear systems, Block diagram representation, and reduction techniques. Signal flow graph. Mason's gain formula, system components, potentiometer, tachogenerator, a.c. and d.c. servomotors, synchros, stepper motor.

Time Response
Time response of first, second and higher order systems to impulse, step and ramp inputs, Time response specifications, types of systems, steady state error and error constants. Basic control action and automatic controllers, Effect of PI, PD and PID controllers on system performance.

Stability Analysis of Linear Systems
Concept of stability, necessary condition for stability, absolute and relative stability,Routh Hurwitz criterion, Construction of Root loci and its application, Stability analysis of electrical systems.

Frequency Domain Analysis
Correlation between time and frequency response, frequency domain analysis, Bode plot, Gain Margin, Phase Margin, Polar plot, Nyquist Criterion, effect of feedback on frequency domain analysis, constant M circle, N circle.

Design and Compensation
Design consideration of control system, lead, lag, lead-lag compensation, Design of compensating network using bode plots and root locus.

Course Syllabi (Practical):

1. Introduction to MATLAB Computing Control Software.
2. Defining Systems in TF, ZPK form:
   (a) Plot step response of a given TF and system in state-space. Take different values of damping ratio and wn natural undamped frequency.
   (b) Plot ramp response.
3. For a given 2nd order system plot step response and obtain time response specification.
4. To design 1st order R-C circuits and observe its response with the following inputs and trace the curve.
   (a) Step
   (b) Ramp
   (c) Impulse
5. To design 2nd order electrical network and study its trarient response for step input and following cases.
   (a) Under damped system
   (b) Over damped System.
   (c) Critically damped system
6. To Study the frequency response of following compensating Networks, plot the graph and final out corner frequencies.
   (a) Log Network
   (b) Lead Network
   (c) Log-lead Network.
7. To perform experiment on Potentiometer error detector.
8. To draw characteristics of a.c servomotor
9. Plot bode plot for a 2nd order system and find GM and PM.

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40

4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Evaluation Scheme (Practical):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test	2 hour	20
2.	End Term Test	2 hour	40
3.	Class Participation and/or Attendance	Day to day	15
4.	Additional Continuous Evaluation (Assignments, Discipline, Punctuality, & Viva Voce)	Day to day	25

***Note: The ratio of weightage between Theory and Practical content will be (60%: 40% respectively)**

Text / Reference Books:

1. I J Nagrath and M Gopal: Control Systems Engineering, 3rd Ed, New Age Publication.
2. Robert H Bishop : Modern Control Systems, Boyd and Fraser pub
3. B C Kuo: Modern Control Engineering, NEW AGE
4. K.Ogata,"Modern Control Engineering" Prentice Hall of India.
5. Norman S.Nise, "Control System Engineering", John Wiley & Sons.
6. Richard C Dorf, Robert H Bishop : Modern Control Systems, Prentice-Hall

POWER SYSTEM SWITCHGEAR & PROTECTION

Course Code	:	**EE 502**
Course Title	:	**Power System Switchgear & Protection**
Course Credits	:	**5.5**
Total Hours per Week (L+T+P)	:	**3+0+2**

Course Syllabi (Theory):

Introduction to Protection System: Introduction to protection system and its elements, functions of protective relaying, protective zones, primary and backup protection, desirable qualities of protective relaying, basic terminology and HRC fuse.

Relays: Electromagnetic, attracted and induction type relays, thermal relay, gas actuated relay, design considerations of electromagnetic relay, amplitude and phase comparators, over current relays, directional relays, distance relays, differential relay, Comparison with electromagnetic relay, classification and their description, over current relays, directional relay, distance relays, differential relay.

Circuit Breaker: Properties of arc, arc extinction theories, re-striking voltage transient, current chopping, resistance switching, capacitive current interruption, short line interruption, circuit breaker ratings, operating modes, selection of circuit breakers, constructional features and operation of bulk oil, minimum oil, air blast, sf6, vacuum and d. c. circuit breakers.

Transmission Line and Busbar Protection: Over current protection, distance protection, pilot wire protection, carrier current protection Effect of arc resistance, three stepped distance protection of transmission line, Differential protection of bus bars, high impedance relay scheme, frame leakage protection.

Feeder Protection: Brief description of overcurrent protective schemes for a feeder, parallel feeders and ring mains.

Generator Protection: Stator protection – differential and percentage differential protection, protection against stator inter-turn faults, stator overheating protection. Rotor protection protection against excitation and prime mover failure, field earth fault and unbalanced stator currents (negative sequence current protection).

Transformer Protection: Percentage differential protection, magnetizing inrush current, percentage differential relay with harmonic restraint. Buchholz relay. Differential protection of generator transfer unit.

Course Syllabi (Practical):

1. Study the burden effect on the performance of CT and measure ratio error.
2. Find out the sequence components of currents in three 1-Phase transformers and 3-Phase transformer and compare their results.
3.
   (i) Study over current relay.
   (ii) Draw the current-time characteristic of an over current relay for TMS=1 & 0.5 and PSM=1.25 & 1.0.
4.
   (i) Study percentage bias differential relay.
   (ii) Plot the characteristics of a percentage bias differential relay for 20%, 30% and 40% biasing.
5. Study gas actuated Buchholz relay
6. Study under frequency relay and check it's setting experimentally.
7. Study a typical grid substation
8. Study earthing of power station, substation and building

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20

2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40
4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Evaluation Scheme (Practical):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test	2 hour	20
2.	End Term Test	2 hour	40
3.	Class Participation and/or Attendance	Day to day	15
4.	Additional Continuous Evaluation (Assignments, Discipline, Punctuality, & Viva Voce)	Day to day	25

***Note: The ratio of weightage between Theory and Practical content will be (60%: 40% respectively)**

Text / Reference Books:

1. Sunil S. Rao – "Switchgear and Protection" Khanna Publications New Delhi
2. B. Ram, D.N. Vishwakarma- Power system protection and switchgear-TMH
3. V.K.Mehta, Rohit Mehta: Principles of Power System- S.Chand.
4. J.B.Gupta: Transmission & Distribution of Electrical Power- S.K.Kataria & Sons.

MATLAB PROGRAMMING

Course Code	:	**EE503**
Course Title	:	**MATLAB Programming**
Course Credits	:	**5.5**
Total Hours per Week (L+T+P)	:	**3+0+2**

Course Syllabi (Theory):

Introduction: Engineering Problems and the Need for Computer Solutions ,Basics of MatLab: Menus – Toolbars – Computing with MatLab – Script Files and the Editor/Debugger – MatLab help System

Interactive Computation: Matrices and Vectors, Matrix and Array Operations, Character strings, A Special Note on Array Operations, Command Line Functions, Using Built-in Functions and On-line Help, Saving and Loading Data, Plotting Simple Graphs

Programming in MATLAB: Scripts and Functions Files, Language-special c Features, Conditionals and loops, Advanced Data Objects, Multidimensional matrices Structures, Cells.

Applications: Linear Algebra, Curve Fitting and Interpolation, Data Analysis and Statistics, Numerical Integration (Quadrature), Ordinary Differential Equations, Nonlinear Algebraic Equations.

Graphics: Basic 2-D Plots, Using subplot for Multiple Graphs, 3-D Plots, Handle Graphics, Fun with 3-D Surface Graphics, Saving and Printing Graphs

Errors: Computer Algebra and The Symbolic Math Toolbox box, Numeric verus symbolic computation, Getting help with the Symbolic Math Toolbox, Using the Symbolic Math Toolbox, Some Symbolic Math Toolbox commands

Idea about Simulink, problems based on Simulink.

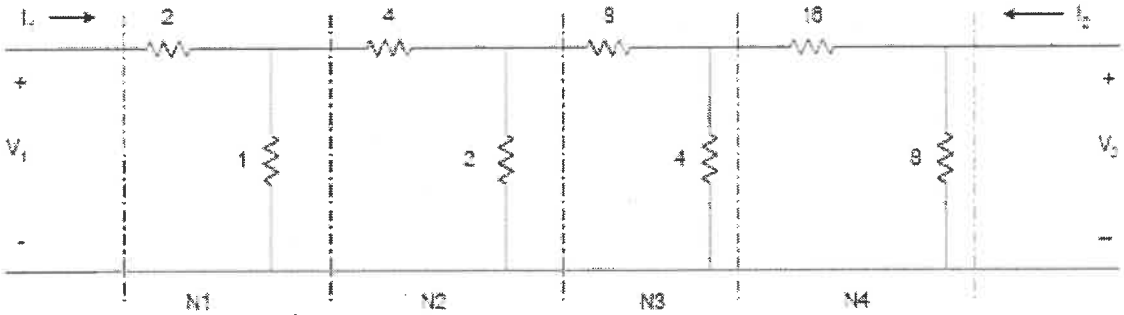
Course Syllabi (Practical):

1. Determination of Eigen values/vectors of a square matrix and roots of a polynomial and Solution of difference equations.
2. Use MATLAB to determine the roots of the following polynomials. Plot the polynomial over the appropriate interval to verify the roots location.

(a) $f_1(x) = x^2 + 4x + 3$

(b) $f_2(x) = x^3 + 5x^2 + 9x + 5$

3. Use MATLAB to determine transmission parameters for the cascaded system as shown below (The resistance values are in Ohms).

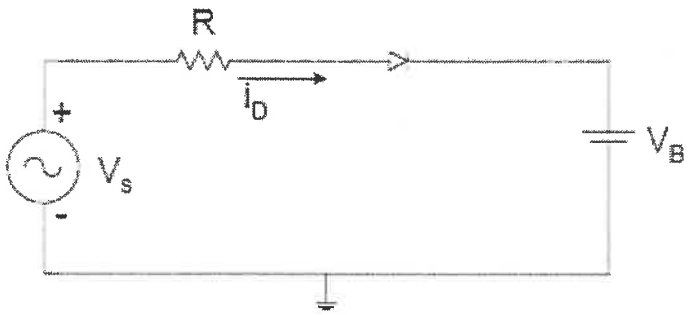


4. A forward-biased diode has the following corresponding voltage and current. Use MATLAB to determine the reverse saturation current, IS and diode parameter.

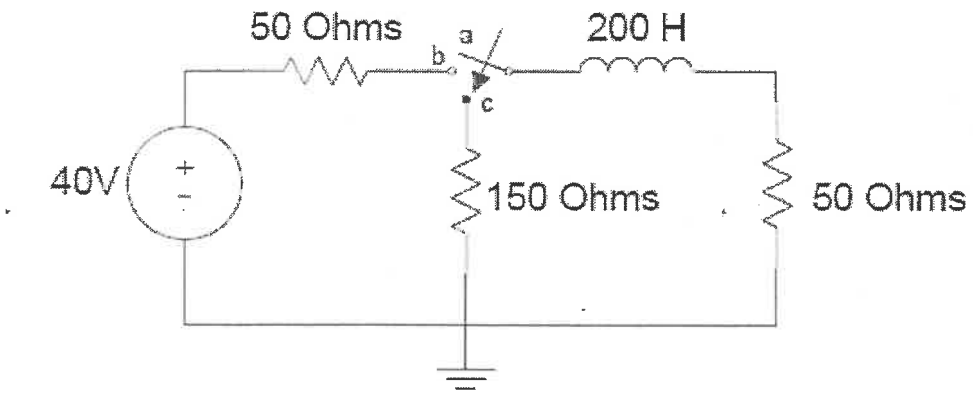
Forward Voltage, V	Forward Current, A
0.1	0.133e-12
0.2	1.79e-12
0.3	24.02e-12
0.4	0.321e-9
0.5	4.31e-9
0.6	57.69e-9
0.7	7.726e-7

5. A battery charging circuit is shown in Figure 9.10. The battery voltage is $V_B = 118$. V. The source voltage is $V_S(t) = 18\sin(120\pi t)$ V and the resistance is R = 100 Ω. Use MATLAB (a) to sketch the input voltage, (b) to plot the current flowing through the

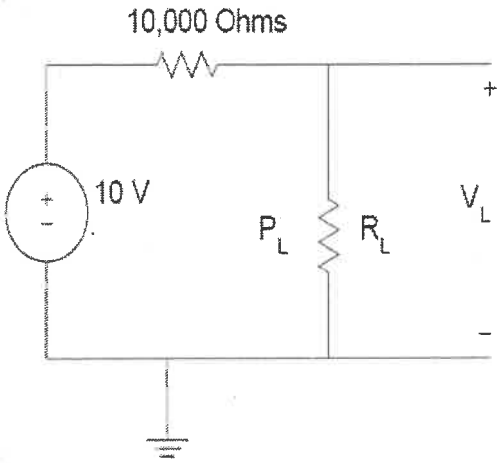
diode, (c) to calculate the conduction angle of the diode, and (d) calculate the peak current. (Assume that the diode is ideal.)



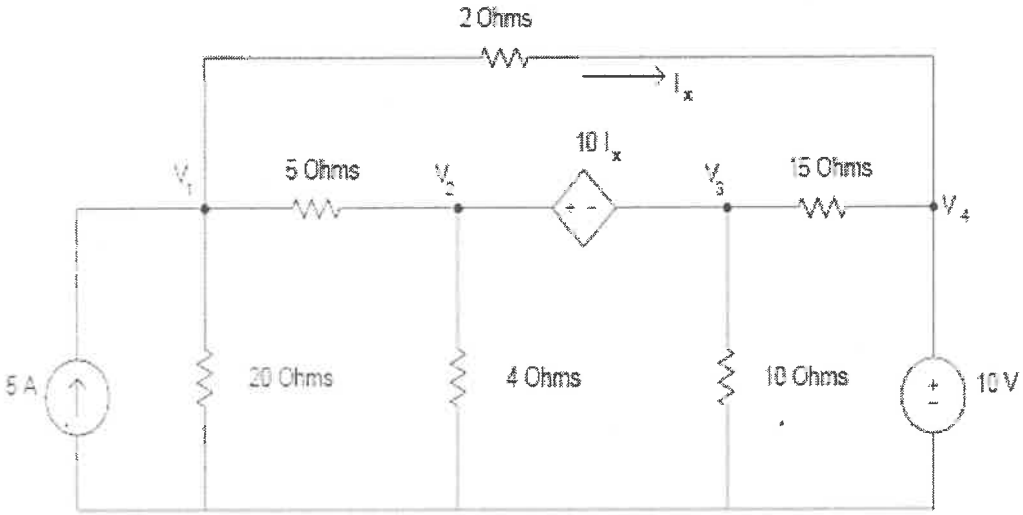
6. For the sequential circuit as shown below, the current flowing through the inductor is zero. At t = 0, the switch moved from position a to b, where it remained for 1 s. After the 1 s delay, the switch moved from position b to position c, where it remained indefinitely. The MATLAB program for plotting current i(t) flowing through the inductor versus time.



7. Using Matlab programme verify that the maximum power dissipation by the load and Plot the power dissipated by the load.



8. Use Matlab for finding nodal voltages of the circuit as shown below.



9. Simulation of Step response & Impulse response for type-0, type-1 & Type-2 system with unity feedback using MATLAB .
10. Determination of Root locus, Bode plot, Nyquist plot using MATLAB control system tool box for 2nd order system & determination of different control system.

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40
4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Evaluation Scheme (Practical):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test	2 hour	20
2.	End Term Test	2 hour	40
3.	Class Participation and/or Attendance	Day to day	15
4.	Additional Continuous Evaluation (Assignments, Discipline, Punctuality, & Viva Voce)	Day to day	25

***Note: The ratio of weightage between Theory and Practical content will be (60%: 40% respectively)**

Text / Reference Books:

1. Rudra Pratap Getting Started with MATLAB, Oxford University Press, USA
2. Shailendra Jain,Modeling & Simulation Using MATLAB Simulink, Wiley (2011)
3. Applied numerical methods with MATLAB for engineers and scientists, Chapra, Steven C. New Delhi TMH 2008, 2011
4. Yang, Won Young ; Cao, Wenwu ; Chung, Tae-Sang ; Morris, John ,"Applied numerical methods using MATLAB" Wiley India 2007
5. Almos Gilat, "MATLAB: An Introduction with Applications" Wiley India Ltd., 2004.

LINEAR INTEGRATED CIRCUITS

Course Code	:	**ECE501**
Course Title	:	**Linear Integrated Circuits**
Course Credits	:	**5.5**
Total Hours per Week (L+T+P)	:	**3+0+2**

Course Syllabi (Theory):

- Operational Amplifiers: Op-amp Basics, Properties of Ideal Op-Amp, Inverting, Non-inverting, Summing, Difference amplifier, Voltage Follower, Current-to-Voltage Converter, and Characteristics of Practical Op-Amp, Effect of Non-ideal behavior on Op-Amp performance, Differentiator, Integrator, Exponential and logarithmic amplifier, Analog Multiplier, Precision Half wave and Full wave rectifiers, Clipper and Clamper, Peak Detector, Comparator and its applications, Schmitt Trigger.
- Active Filters: Low pass, high pass, band pass and band reject filters, all-pass filter, Switched capacitor filter, Butterworth filter design, Chebyshev Filter design.
- Phase Locked Loops:Operating Principles of PLL, Linear Model of PLL, Lock range, Capture range, Applications of PLL as FM detector, FSK demodulator, AM detector, frequency translator, phase shifter, tracking filter, signal synchronizer and frequency synthesizer, Building blocks of PLL, LM565 PLL.
- Analog to Digital and Digital to Analog Convertors: Analog switches, High speed sample and hold circuits and sample and hold ICs, Types of D/A converter, Current driven DAC, Switches for DAC, A/D converter-Flash, Single slope, Dual slope, Successive approximation, Delta Sigma Modulation, Voltage to Time converters.
- Special Function IC's: Four quadrant multiplier & its applications, Basic blocks of linear IC voltage regulators, Three terminal voltage regulators, Positive and negative voltage regulators, Frequency to Voltage converters, Voltage to Frequency converters, Tuned amplifiers, power amplifiers, Isolation Amplifiers, Video amplifiers, Fiber optic ICs and Opto-couplers.

Course Syllabi (Practical):

1. Active low-pass, High-pass and band-pass filters.
2. Study of VCO and PLL ICs
    a. Voltage to frequency characteristics of NE/ SE 566 IC.

b. Frequency multiplication using NE/SE 565 PLL IC.

3. Study of Analog to Digital Converter and Digital to Analog Converter: Verification of A/D conversion using dedicated IC's.
4. DC power supply using LM317 and LM723.
5. Study of SMPS

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40
4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Evaluation Scheme (Practical):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test	2 hour	20
2.	End Term Test	2 hour	40
3.	Class Participation and/or Attendance	Day to day	15
4.	Additional Continuous Evaluation (Assignments, Discipline, Punctuality, & Viva Voce)	Day to day	25

***Note: The ratio of weightage between Theory and Practical content will be (60%: 40% respectively)**

Text Books:

1. Op-Amps and Linear Integrated Circuits, Ramakant A. Gayakwad, PHI Learning, 4th Edition.
2. Linear Integrated Circuits, D.Roy Choudhry, Shail Jain, New Age International Pvt. Ltd., 2000.

Reference Books:

1. Analysis and Design of Analog Integrated Circuits, Gray and Meyer, Wiley International, 1995.
2. Design with operational amplifiers and analog integrated circuits, Sergio Franco, McGraw-Hill, 1997.
3. Op-amp & Linear ICs, David A. Bell, Prentice Hall of India, 2nd Edition, 1997

ENGINEERING SIGNALS & SYSTEMS

Course Code	:	**ECE505**
Course Title	:	**Engineering Signal & Systems**
Course Credits	:	**5.5**
Total Hours per Week (L+T+P)	:	**3+1+0**

Course Syllabi (Theory):

- **Introduction:** Continuous time and discrete time systems, Properties of systems. Linear time invariant systems - continuous time and discrete time. Properties of LTI systems and their block diagrams. Convolution, Discrete time systems described by difference equations.
- **Fourier Series Representation Of Signals:** Fourier series representation of continuous periodic signal & its properties, Fourier series representation of Discrete periodic signal & its properties, Continuous time filters & Discrete time filters described by Diff. equation.
- **Fourier Transform:** The continuous time Fourier transform for periodic and aperiodic signals, Properties of CTFT. Discrete time Fourier transform for periodic and aperiodic signals. Properties of DTFT. The convolution and modulation property.
- **Laplace and Z-Transform:** Laplace transform, Properties of Laplace Transform, Application of Laplace transform to system analysis.
  Introduction. The region of convergence for the Z-transform. The Inverse Z-transform.
  Two dimensional Z-transform. Properties of Z transform.
- **Sampling:** Mathematical theory of sampling. Sampling theorem. Ideal & Real sampling. Interpolation technique for the reconstruction of a signal from its samples. Aliasing. Sampling in freq.domain. Sampling of discrete time signals..

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40
4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Evaluation Scheme (Practical):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test	2 hour	20
2.	End Term Test	2 hour	40
3.	Class Participation and/or Attendance	Day to day	15
4.	Additional Continuous Evaluation (Assignments, Discipline, Punctuality, & Viva Voce)	Day to day	25

***Note: The ratio of weightage between Theory and Practical content will be (60%: 40% respectively)**

Text Books:

1. Signals And Systems by Tarum Kumar Rawat, Oxford.

Reference Books:

1. Signals And Systems by Oppenhiem Willsky- Nawabi, PHI
2. Linear Systems and Signals by B.P.Lathi, Oxford

ELECTRICAL MATERIALS

Course Code	:	**EE521 (Elective-I)**
Course Title	:	**Electrical Materials**
Course Credits	:	**4**
Total Hours per Week (L+T+P)	:	**3+0+0**

Course Syllabi (Theory):

Introduction: Classification of materials; Structure-property Relations; Metals & Alloys, Ceramics, Polymers, Composites and Semiconductors. Atomic Structure & Interatomic Bonding; Fundamentals of Atomic Structure and Chemical Bonding; Atomic Bonding in Solids.

Diffusion in solids: Fick's Laws of Diffusion; The Atomic Model of Diffusion, Phase Transformations: Nucleation and Growth, Recovery, Recrystallization and Grain Growth.

Structure of solids: Crystalline and Non-crystalline states; Crystallographic directions and phases; Determination of crystal structures.

Defects and imperfections in solids: Point, Line and Planer defects; Interfacial defects and volume defects, impurities in solids.

Elastic, Plastic and Viscoelastic Behaviour of materials: Stress-strain relationship; relaxation and creep; strengthening mechanism and fracture.

Thermal properties of materials: Heat capacity; Thermal expansion and thermal conductivity.

Electrical properties: Electronic and Ionic conduction; Energy Band structures in solids; Electron, Mobility ; Temperature variation of conductivity.

Dielectric behaviour: Capacitance; Types of polarization; Frequency dependence of dielectric constant; Ferroelectricity and Piezoelectricity in materials.

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40
4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Text/Reference Books:

1. Electrical Engineering by R.K. Rajput
2. Electrical Engineering Materials. by T.K. Basak

Advanced Distribution System

Course Code	:	**EE522 (Elective-I)**
Course Title	:	**Advanced Distribution System**
Course Credits	:	**4**
Total Hours per Week (L+T+P)	:	**3+0+0**

Course Syllabi (Theory):

Distribution Systems & Load Forecasting: Distribution of power, future distribution systems, power loads, Introduction, load survey, load forecasting-regression analysis, correlation theory, analysis of time series, load growth factors, sources of error.

Operation: Operation criterion and standards: Voltage control – voltage regulation, kVA – km conductor loading, correction of system voltage. Harmonics, effects of harmonics on networks, limits of harmonics, filters. Load variations- causes of voltage fluctuations, measures to reduce flickering. Ferroresonance. System losses, introduction, losses in components, measurement of losses, reduction of losses

Distribution Power Capacitors: Reactive power flow, monitoring and compensation in distribution system, maintaining system voltage, Series and shunt capacitors, comparison. Shunt capacitors in distribution system - LT and HT shunt capacitors, capacitor rating for power factor improvement, constructional features. System harmonics.

Grounding: Grounding system, earth and safety, earth electrode- earth resistance calculation, effect of rod size and soil resistivity, earth conductor sizes, Introduction to earth electrode design. Brief description of system earthingsystem neutral earthing, earthing of substations, lines and consumer premises, Earth fault protection of feeders.

Distribution Automation: Introduction to distribution automation, Concept of communication power line carrier, radio communication, fibre optics, satellite communication and sensors, Introduction to supervisory control and data acquisition (SCADA), Brief descriptor of an automation system.

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40
4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Text / Reference Books

1. A S Pabla: Electric Power Distribution. (TMH)
2. B R Gupta: Power System Analysis & Design, S. Chand Publishers
3. Nagrath Kothari: Modern Power System Analysis. (TMH)
4. J. J. Grainger& W. D. Stevenson: Power System Analysis (TMH).
5. Kamaraju: Electrical Power Distribution Systems (TMH)

DATA STRUCTURES

Course Code	:	**CSE301 (Elective-I)**
Course Title	:	**Data Structures**
Course Credits	:	**4**
Total Hours per Week (L+T+P)	:	**3 + 0 + 0**

Course Syllabi (Theory):

- Arrays as storage elements for representing polynomial of one or more degrees or addition & multiplication, sparse matrices for transposing & multiplication, stack, queue, dequeue, circular queue for insertion and deletion with condition for over and underflow, transposition of sparse matrices with algorithms of varying complexity (Includes algorithms for operations as mentioned). Evaluation of Expression: Concept of precedence and associativity in expressions, difficulties in dealing with infix expressions, Resolving precedence of operators and association of operands, postfix & prefix expressions, conversion of expression from one form to other form using stack (with & without parenthesis), Evaluation of expression in infix, postfix & prefix forms using stack, Recursion.
- Linear linked lists: singly, doubly and circularly connected linear linked lists insertion, deletion at/ from beginning and any point in ordered or unordered lists, Comparison of arrays and linked lists as data structures. Linked implementation of stack, queue and dequeue, Algorithms for/of insertion, deletion of stack, queue, and dequeue implemented using linked structures. Polynomial representation using linked lists for addition, Concepts of Head Node in linked lists. Searching, sequential and binary search.
- Non-Linear Structures: Trees definition, characteristics concept of child, sibling, parent child relationship etc., binary tree: different types of binary trees based on distribution of nodes, binary tree (threaded and unthreaded) as data structure, insertion, deletion and traversal of binary trees, constructing binary tree from traversal results, Threaded binary

Tree, Time complexity of insertion, deletion and traversal in threaded and ordinary binary trees. AVL tree: Concept of balanced trees, balance factor in AVL trees, insertion into and deletion from AVL tree, balancing AVL tree after insertion and deletion, Application of trees for representation of sets.

- Graphs: Definition, Relation between tree & graph, directed and undirected graph, representation of graphs using adjacency matrix and list, Depth first and breadth first traversal of graphs, finding connected components and spanning tree, Single source single destination shortest path algorithms. Sorting: Insertion, quick, Merge, heap, topological and bubble sorting algorithms for different characteristics of input data. Comparison of sorting algorithms in term of time complexity.

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40
4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Text Books:

T1. Reema Thareja, Data Structure using C, Oxford Education, Third Edition, 2012

T2. Data Structures through C, Yashwant Kanetkar, BPB Publications Sixth Edition, 2012

Reference Books:

R1 Alfred V. Aho, Jeffrey D. Ullman, John E. Hop croft, Data Structures and Algorithms. Pearson Education, 2012.

PRACTICE SCHOOL – I

Course Code	:	**PS501**
Course Title	:	**Practice School – I**
Course Credits	:	**4**
Duration	:	**6 Weeks**

Course Syllabi:

This course is for 6 weeks at the end of 4th semester during summer term of 4 year full time B. Tech. and 5 year Integrated Dual degree (B.Tech + M.Tech, B.Tech + MBA) programs in all the engineering disciplines. The objective of this programme is to provide the students an understanding of working of corporate world in various functions associated with an Industry/Organization. During this programme, they will observe and learn various real world applications of their curricula and develop an understanding of vast engineering operations and its various facets such as inventory, productivity, management, information systems, human resource development, data analysis etc. The general nature of PS-1 assignments is of study and orientation.

Evaluation Scheme:

S. No.	Evaluation Component	Marks (100) (Weightage %)
1	Quiz-I	4
2	Quiz-II	4
3	Group Discussion-I	4
4	Group Discussion-II	4
5	Seminar-I	4
6	Seminar-II	4
7	Diary-I	4
8	Diary-II	4
9	Observation-I	4
10	Observation- II	4
11	Mid Term Evaluation (Project Report and Presentation/Viva)	20
12	Final Evaluation (Project Report and Presentation/Viva)	40

JK Lakshmipat University

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INSTITUTE OF ENGINEERING AND TECHNOLOGY

4 Year B. Tech Programme

(Branch: Electrical Engineering)

Batch 2012-2016

SEMESTER-SIXTH

Detailed Syllabus

&

Scheme of Examination

Academic Council (20.04.2013)

GENERATION OF ELECTRICAL POWER

Course Code	:	**EE601**
Course Title	:	**Generation of Electrical Power**
Course Credits	:	**4**
Total Hours per Week (L+T+P)	:	**3+0+0**

Course Syllabi (Theory):

Tariffs & Selection of Power Plants : Objectives of tariffs. General tariff form. Flat demand rate, straight meter rate, block meter rate. Two part tariff, power factor dependent tariffs, three-part tariff. Spot (time differentiated) pricing, comparative study of thermal, hydro, nuclear and gas power plants. Base load and peak load plants. Size and types of generating units, types of reserve and size of plant. Selection and location of power plants

Hydro Power Plant: Ecological aspects of Power Generation Hydro-Electric Stations-Choice of site, arrangement of hydroelectric installations, Hydrology, Mass curve, flow duration curve, water storage, classification of hydroelectric plants, pumped storage plants, operating cost of hydroelectric station, tidal power generation, mini-micro hydro power stations.

Thermal Power Stations: Choice of coal fired station site, arrangement of plant and principal auxiliaries, coal handling plant, Ash handling plant, heat recovery equipments, main electrical equipments, instrumentation, speed governor. Operating cost. Diesel and Gas Power plants.

Nuclear Power Stations: Nuclear Physics, Atomic energy fuels, moderator materials, fissile and fertile materials. Fission & Fusion reactions, Choice of site, types of reactors, principal parts of nuclear power plant, operation and control of reactors. Comparison of various Power Plants.

Power Plant Economics: Economic Aspects of Power Plant Operation-Fixed charges, interest and depreciation charges, methods of depreciation, straight line and sinking fund methods,

different tariffs, effect of load factor, demand and diversity factors, power factor improvement by static and synchronous capacitors, power factor improvement, Active and reactive power control.

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40
4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Text / Reference Books:

1. Non-Conventional Energy Sources-G.D.Rai-Khanna Publication
2. Electrical Energy System Theory – O.I.Elgerd
3. Towards Clean Energy – B.Ghosh, Saha B., S.K.Basu, Sujay
4. Power System Engineering – I.J.Nagrath & D.P.Kothari
5. Generation of Electrical Energy –B.R. Gupta
6. Elements of power station design – M.V.Deshpande
7. Economic Load Dispatching - L. R. Kirchmare

POWER SYSTEM ANALYSIS

Course Code	:	**EE602**
Course Title	:	**Power System Analysis**
Course Credits	:	**5.5**
Total Hours per Week (L+T+P)	:	**3+0+2**

Course Syllabi (Theory):

Unit-I

Percent and per unit quantities. Single line diagram for a balanced 3-phase system. Admittance Model: Branch and node admittances Equivalent admittance network and calculation of Y bus. Modification of an existing Y bus. Transient on a Transmission line, short circuit of a synchronous machine on no load, short circuit of a loaded synchronous machine. Equivalent circuits of synchronous machine under sub transient, transient and steady state conditions.

Unit-II

Fortescure theorem, symmetrical component transformation. Phase shift in star-delta transformers. Sequence Impedances of transmission lines, Synchronous machine and Transformers, zero sequence network of transformers and transmission lines. Construction of sequence networks of power system. Analysis of single line to ground faults using symmetrical components, connection of sequence networks under the fault condition.

Unit-III

Power system stability, power angle curve, transfer reactance, swing equations, steady state stability theoretical and practical, transient stability using equal area criterion and step by step method. Introduction to Grid Failure, Methods of improving stability using traditional techniques and new approaches eg. High speed fault clearing, reduction of transmission system reactance, regulated shunt compensation, dynamic braking, and Independent pole operation of circuit breaker acting automatic voltage regulation.

Unit-IV

Load frequency control, nature of control problems, Basic concept of Governor Mechanism and

Their performance in steady state, Turbine and Generator model. Load frequency control of an isolated power system. Division of load between Generators, Basic concept of control area.

Unit-V

Load flow problem, development of load flow equations, bus classification. Gauss Seidel, Newton Raphosn, decoupled and fast decoupled methods for load flow analysis. Comparison of load flow methods.

Course Syllabi (Practical):

1. Simulate Swing Equation in Simulink (MATLAB)
2. Modelling of Synchronous Machine
3. Modelling of Induction Machine.
4. Simulate simple circuits using Circuit Maker
5. Modelling of Synchronous Machine
6. Simulation of Synchronous Machine with FACTS device.
7. Modelling of Synchronous Machine with FACTS device
8. Simulation of Synchronous Machine with FACTS devices.
9. FACTS Controller designs with FACT devices for SMIB system

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40
4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Evaluation Scheme (Practical):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test	2 hour	20
2.	End Term Test	2 hour	40
3.	Class Participation and/or Attendance	Day to day	15
4.	Additional Continuous Evaluation (Assignments, Discipline, Punctuality, & Viva Voce)	Day to day	25

***Note: The ratio of weightage between Theory and Practical content will be (60%: 40% respectively)**

Text / Reference Books:

1. Power system engineering -Nagarath & Kothari
2. Electric Power System -B.M.Weedy
3. Power System Stability & Control -P.Kundur
4. Electrical Power System -C.L. Wadhwa
5. Power System Engineering – I.J.Nagrath & D.P.Kothari

INDUSTRIAL ELECTRONICS

Course Code	:	**EE603**
Course Title	:	**Industrial Electronics**
Course Credits	:	7
Total Hours per Week (L+T+P)	:	**3+1+2**

Course Syllabi (Theory):

Introduction to Solid State Power Devices & Operation : SCR, G.T.O., Power transistor, Classification of SCR triggering methods, design and operation of triggering circuits, commutation methods, pulse transfer and isolation scheme, protection of power devices. Series & parallel operation of SCRs.

Phase Controlled Converters: Single phase uncontrolled, half-controlled and fully controlled converters. Three-phase half-controlled and full controlled bridge converters.

Choppers: Principle of operation of chopper, types of choppers (single, two and four quadrant choppers), various commutation methods, and voltage commutated chopper and current commutated choppers, Principle of cycloconverter operation, single phase to single phase cycloconverter circuit

Regulators: Single phase A.C. Regulators-different circuit configurations and their operation.

Inverters: Voltage & current source inverters, single phase half bridge and full bridge inverter with resistive load and inductive load, concept of feedback diode, three phase bridge inverters. Basics of PWM inverters.

Cycloconverters: Three-phase to single-phase and three-phase to three phase configurations.

RESTRUCTURED POWER SYSTEMS

Course Code	:	**EE604**
Course Title	:	**Restructured Power Systems**
Course Credits	:	**4**
Total Hours per Week (L+T+P)	:	**3+0+0**

Course Syllabi (Theory):

UNIT I: Need and conditions for deregulation. Introduction of Market structure, Market Architecture, Spot market, forward markets and settlements. Review of Concepts marginal cost of generation, least-cost operation, and incremental cost of generation. Power System Operation:-Old vs. New

UNIT II :Electricity sector structures and Ownership /management, the forms of Ownership and management. Different structure model like Monopoly model, Purchasing agency model, wholesale competition model, Retail competition model.

UNIT III :Framework and methods for the analysis of Bilateral and pool markets, LMP based markets, auction models and price formation, price based unit commitment, country practices

UNIT IV :Transmission network and market power. Power wheeling transactions and marginal costing, transmission costing. Congestion management methods- market splitting, counter-trading; Effect of congestion on LMPs- country practices

UNIT V :Ancillary Services, Standard Market Design, Distributed Generation in restructured markets, Developments in India, IT applications in restructured markets, working of restructured power systems

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40
4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Text / Reference Books:

1. Understanding electric utilities and de-regulation, Lorrin Philipson, H. Lee Willis, Marcel Dekker Pub., 1998.
2. Operation of restructured power systems. Kankar Bhattacharya, Jaap E. Daadler, Math H.J. Boolen, Kluwer Academic Pub., 2001.
3. Restructured electrical power systems: operation, trading and volatility Mohammad Shahidehpour, Muwaffaq Alomoush, Marcel Dekker Pub., 2001.
4. Operation of restructured power systems - K. Bhattacharya, M.H.J. Bollen and J.E. Daalder
5. Market operations in electric power systems - M. Shahidehpour, H. Yamin and Z. Li
6. Fundamentals of power system economics - S. Kirschen and G. Strbac
7. Optimization principles: Practical Applications to the Operation and Markets of the Electric Power Industry - N. S. Rau

OPTIMIZATION TECHNIQUES

Course Code	:	**MA 601**
Course Title	:	**Optimization Techniques**
Course Credits	:	**5.5**
Total Hours per Week (L+T+P)	:	**3 + 1 + 0**

Course Syllabus:

- **Introduction:** Introduction to Optimization and its scope, Formulating a Mathematical Model, Deriving Solutions from the Model
- **Linear Programming Problems:** Introduction to Linear Programming, Linear Programming Model, Solving L.P.P - Simplex Method, Revised Simplex Method, Duality Theory and Sensitivity Analysis, Dual Simplex Method, Transportation Problem and transportation problem paradox, Assignment Problem
- **Non-linear Programming**: Introduction, Single variable and multi variable optimization, Constrained and unconstrained problems, Kuhn-Tucker conditions
- **Network Optimization Models:** The Terminology of Networks, Shortest-Path Problem, Minimum Spanning Tree Problem, Project Management with CPM/ PERT
- **Other Optimization Models:** Dynamic Programming, Integer Programming, Game Theory,
- **Simulations:** Simulation V/s mathematical modeling, Monte Carlo simulation, simulation language, ARENA, Example & cases.
- **Multi-objective optimization**: Introduction to various multi-objective optimization techniques and its scope, Linear Goal Programming and Its Solution

Evaluation Scheme:

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40
4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	---	10

Text & Reference Books

1. Hillier F.S. and Lieberman G.J., *Introduction to Operations Research: Concepts and Cases*, Tata Mc Graw Hill, 8th Ed., (Indian Adapted Edition), 2005.
2. Taha. H. A, *Operations Research: An Introduction*, Pearson Education, 7th ed., 2003.
3. Ronald L. Rardin, *Optimization in Operations Research.* Pearson Education, First Indian Reprint 2002.
4. Pant.J.C., *Introduction to Optimization: Operations Research*, Jain Brothers, 5th Ed., 2000.
5. Sharma. S. D., *Operations Research*, Kedarnath Ramnath & Co., 15th Edition, 2006.
6. Kalyanmoy Deb, Optimization for Engineering Design: Algorithms and Examples, PHI.
7. Kasana H.S. and Kumar K.D., Introductory Operations Research: Theory and Applications, Springer.

MICROPROCESSORS & INTERFACING

Course Code	:	**ECE622 (Elective-II)**
Course Title	:	**Microprocessors & Interfacing**
Course Credits	:	**4**
Total Hours per Week (L+T+P)	:	**3+0+0**

Course Syllabi (Theory):

- Introductionto8085ACPUarchitecture – register organization, addressing modes and their features. Software instruction set and Assembly Language Programming. Pin descriptionandfeatures.
- Instruction cycle, machine cycle, Timing diagram.
- Hardware Interfacing: Interfacing memory, peripheral chips (IO mapped IO & Memory mapped IO).
- Interrupts and DMA.
- Peripherals: 8279, 8255, 8251, 8253, 8237, 8259, A/D and D/A converters and interfacing of the same.
- Typical applications of a microprocessor.
- 16 bit processors: 8086 and architecture, segmented memory has cycles, read/write cycle in min/max mode. Reset operation, wait state, Halt state, Hold state, Lock operation, and interrupt processing. Addressing modes and their features. Software instruction set (including specific instructions like string instructions, repeat, segment override, lock prefizers and their use) and Assembly Language programming with the same.
- Brief overview of some other microprocessors (eg.6800Microprocessor).

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40
4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Text Books:

1. Ramesh S. Gaonkar, "Microprocessor Architecture, programming and applications with the 8085", Penram International
2. Ray, A.K. & Burchandi, K.M, "Advanced Microprocessors and Peripherals: Architecture, Programaming and Interfacing", McGraw Hill.
3. B.Ram, "Advanced Microprocessor & Interfacing", McGraw Hill.

Reference Books:

1. Uffenbeck, John, "Microcomputers and Microprocessors", PHI.
2. Douglas Hall, "Microprocessors Interfacing",McGraw Hill.
3. Krishna Kant, "Microprocessors and Microcontrollers", PHI.

DIGITAL COMMUNICATIONS

Course Code	:	**ECE602 (Elective-II)**
Course Title	:	**Digital Communications**
Course Credits	:	**4**
Total Hours per Week (L+T+P)	:	**3+0+0**

Course Syllabi (Theory):

- **Elements of Digital Communication Systems :** Elements of Digital Communication Systems: Model of Digital Communication Systems, Digital Representation of Analog Signal, Certain issues in Digital Transmission, Advantages of Digital Communication Systems, Bandwidth-S/N tradeoff,bHartley Shannon Law, Sampling Theorem

- **Pulse Code Modulation:** Pulse Code Modulation: PCM Generation and Reconstruction, Quantization noise, Non uniform Quantization and Companding, DPCM, Adaptive DPCM, DM and Adaptive DM. Noise in PCM and DM.

- **Digital Modulation Techniques:** Digital Modulation Techniques: Introduction, ASK,ASK Modulator, Coherent ASK Detector, Non-Coherent ASK Detector, FSK, Bandwidth and Frequency Spectrum of FSK. Non coherent FSK Detector, Coherent FSK Detector, FSK Detection Using PLL, BPSK, Coherent PSK Detection, QPSK, Differential PSK.

- **Baseband transmission and Optimal Reception of Digital Signal:** Baseband transmission and Optimal Reception of Digital Signal: Pulse shaping for optimum transmissions. A Baseband Signal Receiver, Probability of Error. Optimum Receiver, optima! of Coherent Reception. Signal Space Representation and Probability of Error, eye diagrams, Cross talk.

- **Spread Spectrum Modulation:** Spread Spectrum Modulation: Use of Spread Spectrum, Direct Sequence Spread Spectrum (DSSS), Code Division Multiple Access, Ranging using DSSS.
- **Frequency Hopping Spread Spectrum, PN - sequences:** Generation and Characteristics. Synchronization in Spread Spectrum Systems.

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40
4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Text Books:

1. Principles of communication systems - Herbert Taub. Donald L Schiling, Goutam Sana,3rdEdition,McGraw-Hill, 2008.
2. Digital and Analog Communicator Systems - Sam Shanmugam, John Wiley, 2005.

Reference Books:

1. Digital Communications - John G. Proakis .Masoudsalehi – 5th Edition, McGraw-Hill, 2008.
2. Digital Communication - Simon Haykin, Jon Wiley, 2005.D
3. Communications - Ian A. Glover, Peter M. Grant, Edition, Pearson Edu.
4. Communication Systems-B.P. Lathi, BS Publication, 2006

DIGITAL SIGNAL PROCESSING

Course Code	:	**ECE603 (Elective-II)**
Course Title	:	**Digital Signal Processing**
Course Credits	:	**4**
Total Hours per Week (L+T+P)	:	**3+0+0**

Course Syllabi (Theory):

- **Sampling:** Basic elements of digital signal Processing–Concept of frequency in continuous time and discrete time signals –Sampling theorem –Discrete time signals.
- **Frequency domain analysis:** Discrete Time Fourier Transform (DTFT) and Discrete Fourier Transform (DFT), Periodic convolution, Direct evaluation of DFT, FFT algorithms- decimation in time and frequency, Relationship between Fourier and Z-transforms.
- **Digital filter Structures:** Direct form I & II, cascade form, parallel form, Signal flow graphs.
- **Filter Function Approximations and Transformations:** Review of approximations of ideal analog filter response, Butterworth filter, Chebyshev Type I & II.
- **Design of FIR Digital filters:** Symmetric and anti-symmetric FIR filters, design of linear phase FIR filters using windows and frequency– sampling methods, design of optimum equiripple linear phase FIR filters, comparison of FIR and IIR filters.
- **Design of IIR Digital Filters:** Design based on analog filter approximations, Impulse invariance method, Matched Z-transformation, Bilinear transformation.

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40
4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Text Books:

1. Oppenheim, Buck, Schafer, "Discrete-Time Signal Processing", Pearson Education.
2. Proakis & Manolakis, "Digital Signal Processing: Principles, Algorithms, and Applications", Pearson Education.
3. Rabiner & Gold, "Theory and applications of DSP", PHI.

Reference Books:

1. Antonious, "Digital Filter Design", Mc-Graw-Hill International Editions.
2. De Fatta, Lucas & Hodgkiss, "Digital Signal Processing", WILEY India.

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INSTITUTE OF ENGINEERING AND TECHNOLOGY

4 Year B. Tech Programme

(Branch: Electrical Engineering)

Batch 2012-2016

SEMESTER-SEVENTH

Detailed Syllabus

&

Scheme of Examination

Academic Council (20.04.2013)

Power Quality & Utilization of Electrical Power

Course Code	:	**EE721 (Elective-III/IV/V/VI/VII/VII)**
Course Title	:	**Power Quality & Utilization of Electrical Power**
Course Credits	:	**4**
Total Hours per Week (L+T+P)	:	**3+0+0**

Course Syllabi (Theory):

Introduction of Power Quality: Power Quality Definition, Need for Power Quality, Sensitive Loads, Nonlinear Loads, Interconnected Power System, Deregulation, Utilities, End Users, Lawyers. Power Quality

Characteristics & Power Quality Standards: Power Quality Theory, Types of power Quality Problems, Voltage Swells, Long-Duration Over voltages, Under voltages, Interruptions, Transients, Voltage Unbalance, Voltage Fluctuations, Harmonics, Electrical Noise, Sources of Power Quality Problems, Utility Side of the meter, End-User Side of the meter, Effects of Power Quality Problems, Power Quality Problem-Solving Procedures, Power Quality Solutions, Power Quality Standards Organizations, Institute of Electrical & Electronics Engineers (IEEE), American National Standards Institute(ANSI), International Electro technical Commission(IEC Other International Standards Organizations.

Power Quality Solutions: Reduce Effects on Sensitive Equipment, Reduce or Eliminate Cause, Reduce or Eliminate Transfer Medium, Install Power Conditioning Equipments, Surge Suppressors, Noise Filters, Isolation Transformers, Line-Voltage Regulators, Motor-Generator Sets, Magnetic Synthesizers, Static VAR Compensators (SVCs), Uninterruptible Power Supply (UPS), Solid-State Switches, Harmonics Solutions, Selection of Appropriate Power Conditioning Equipment, Grounding and Wiring Solutions.

Utilization of Electrical Power

(i) **Electric Heating:** Advantages of electrical heating, principle of core type and coreless induction furnace, Electric arc heating; direct and indirect arc heating, construction, working and applications of arc furnace, Dielectric heating, applications in various industrial fields, Infra-red heating and its applications, Microwave heating, Simple design problems of resistance heating element

(ii) **Electric Welding:** Advantages of electric welding, Principle of arc production, electric arc welding, characteristics of arc; carbon arc, metal arc, hydrogen arc welding method of and their applications, comparison between AC and DC arc welding, welding control circuits, welding of aluminum and copper, Introduction to TIG, MIG Welding.

(iii) **Refrigeration and Air Conditioning and Water Coolers:** Principle of air conditioning, vapour pressure, refrigeration cycle, eco-friendly Refrigerants, Description of Electrical circuit used in a) refrigerator, b) air-conditioner, and c) water cooler.

Electric Traction: Advantages of electric traction, Different systems of electric traction, DC and AC systems, diesel electric system, types of services , urban, sub-urban, and main lines and their speed-time curves Different accessories for track electrification such as overhead capacitor wire, conductor rail system, current collector-pantograph , Factors affecting scheduled speed. Electrical block diagram of an electric locomotive with description of various, equipment and accessories. Types of motors used for electric traction, starting and braking of traction motors, Introduction to EMU and metro railways

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40
4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Text / Reference Book:

1. Barry W. Kennedy: Power Quality Primer, McGraw-Hill
2. G.T. Heydt: Power Quality Stars in a circle Publication, Indiana, 1991.
3. Wadha C L: Generation, Distribution and Utilization of electrical energy - New Age International Ltd.
4. Soni, Gupta, Bhatnagar: Electrical Power System – Dhanpat Rai & Sons.
5. Partab H: Art and Science of Utilization of Electrical Energy, Dhanpat Rai & Sons.
6. E.Openshaw Taylor – Utilisation of Electric Energy – Orient Longman, Pitman Publications.

ELECTRICAL INSTALLATION, COMMISSIONING & MAINTENANCE

Course Code	:	**EE722 (Elective-III/IV/V/VI/VII/VII)**
Course Title	:	**Electrical Installation, Commissioning & Maintenance**
Course Credits	:	**4**
Total Hours per Week (L+T+P)	:	**3+0+0**

Course Syllabi (Theory):

Installation: Study and use of theodolite. Types of heavy electrical equipment, unloading accessories precautions for unloading, installation of small and large machines of both static and rotating type, Installation transformer.

Commissioning: commissioning procedure, test required before commission of electrical equipment in respect of : Mechanical fixture and alignment, Electrical tests, Initial precautions for starting. Electrical accidents, safety regulation, treatment of shock,fire extinguishers

Earthing: Reasons for earthing, earthing system earth lead and its size, permissible earth resistance for different installation, improvement of earth resistance, double earthing, earth resistance measurement, rules for earthing.

Preventing Maintenance And Environmental Pollution Prevention: Concepts of preventive maintenance, advantages, preventive maintenance schedule for transformer induction motor, transmission line, circuit breaker and underground cable, preventive measures to control environmental pollution results due to production of: smoke gases, flow of waste material and atomic reactions in research stations, plants, elect. & electronic equipments and accessories.

Testing And Maintenance Of Relay And Circuit Breakers: Testing of relays, factory test, commissioning test and preventive periodic maintenance test,testing of circuit breakers, voltage

test, type test, preventive maintenance of circuit breaker. Insulation Testing. Electrical accidents, safety regulation, treatment of shock, fire extinguishers

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40
4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Text /Reference Books :

1. Electrical Installation Work(Vth Metric Edition) T.G.Francist E.L.B.S
2. Electrical Installation Maintenance & Fault Location Workbook., T.T.T.I.(W.R) Bhopal
3. A Text Book of Electrical Installation Work Vol.2, R.A.Mee., Macdonald London.
4. Electrical Maintenance & Repairs, P.P. Gupta, Dhanpat Rai & Sons Pub.
5. Estimating Commissioning And Maintenance of Electrical Equipment, S.Rao, Khanna Pub.
6. Fundamentals of Maintenance of Electrical Equipments, Bhatia, Khanna Pub.

EHV AC & DC TRANSMISSION

Course Code	:	**EE723 (Elective-III/IV/V/VI/VII/VII)**
Course Title	:	**EHV AC & DC Transmission**
Course Credits	:	**4**
Total Hours per Week (L+T+P)	:	**3+0+0**

Course Syllabi (Theory):

Introduction: Constitution of EHV A.C. and d.c. links, kind of d.c. links, limitation and Advantages of a.c. and d.c. transmission, principal application of a.c. and d.c. transmission, trends in EHV a.c. and d.c. transmission power handling capacity.

EHV Components: Extra-long distance lines, voltage profile of loaded and unloaded line along the line, compensation of lines, series and shunt compensation, shunt reactors, tuned power lines. Traveling waves on transmission systems, their shape, attenuation and distortion, effect of junction and termination on propagation of traveling waves. Over-voltages in transmission system: lightning, switching and temporary over-voltages: control of lighting and switching over-voltages. Converter theory and performance equations – Value characteristics, converter circuits, abnormal operation of converter circuits, harmonics and filters.

Control of HVDC systems: Basic principles of control, control implementation, converter firing control system, valve blocking and bypassing, starting, stopping and power flow reversal.

FACTS: Introduction to FACTS controllers, types of FACTS controllers, Brief description of STATCOM, Thyristor controlled series capacitors and unified power flow controller.

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40
4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Text / Reference Books:

1. EHV AC & DC Transmission - Begamudre
2. EHV AC & DC Transmission - S. Rao
3. H.V.D.C. Transmission – P.Kundur, McGraw Hill Pub.
4. I. J. Nagrath & D. P. Kothari – "Modern Power System Analysis",TMH.

High Power Semiconductor Devices

Course Code	:	**EE724 (Elective-III/IV/V/VI/VII/VII)**
Course Title	:	**High Power Semiconductor Devices**
Course Credits	:	**4**
Total Hours per Week (L+T+P)	:	**3+0+0**

Course Syllabi (Theory):

Basic device models: Theory of bipolar and MOS transistors. Small-signal models of bipolar and MOS transistors, Gummel-Poon model

High current effects in diodes: Dependence of lifetime on high-level injection, non-uniform current distribution under high current injection.

Power bipolar transistors: Onset of high-current effects in transistors; Theories of Kirk effect, crowding, pinch-in effects, second breakdown, Emitter geometries for high current and HF operation.

SCR : Theories of operation; Relation between shorted emitter and dv/dt ratings; Gate turn-off devices, inverter grade SCRs, special diffusion techniques for SCRs. Power VMOS devices.;Heat transfer in power devices

Power MOS devices :VMOS & DMOS device structure and models; device packaging.

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40

4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Text / Reference Books:

1. S.M. Sze, Physics of Semiconductor Devices, 2nd ed., Wiley, 1981.
2. G K Dube,Power Semiconductor Controlled Drives , Hardcover, Prentice Hall
3. B Jayant Baliga ,Power Semiconductor Devices , Hardcover, PWS Pub

FLEXIBLE AC TRANSMISSION SYSTEM

Course Code	:	**EE725 (Elective-III/IV/V/VI/VII/VII)**
Course Title	:	**Flexible AC Transmission System**
Course Credits	:	**4**
Total Hours per Week (L+T+P)	:	**3+0+0**

Course Syllabi (Theory):

Introduction to Facts: Introduction Problems of AC transmission systems, power flow in parallel paths and meshed system, factors limiting loading capability, stability consideration,Power flow control of an ac transmission line, Basic types of facts controllers. Advantages of FACTS technology, Introduction to power factor control. Transformer connections for 12- pulse, 24 pulse and 48 pulse operations.

Static Shunt Compensators: Midpoint and end point voltage regulation of transmission line, and stability improvement. Basic operating principle of Static Synchronous Compensators (STATCOM), Comparison between STATCOM and SVC, Static Series Compensators, Concept of series capacitive compensation, voltage and transient stabilities, power oscillation and sub synchronous oscillation damping. Introduction to thyristor- switched series capacitor (TSSC), thyristor controlled series capacitor (TCSC), and static synchronous series compensator-operation, characteristics and applications.

Static Voltage and Phase Angle Regulators: Voltage and phase angle regulation. Power flow control and improvement of stability by phase angle regulator. Introduction to thyristor controlled voltage and phase angle regulators (TCVR and TCPAR).

UPFC and IPFC: Unified Power Flow Controller (UPFC), basic operating principles, conventional transmission control capabilities, Comparison of UPFC to series compensators and phase angle regulator, Applications of UPFC, Interline Power Flow Controller (IPFC), basic operating principles and characteristics, Applications of IPFC.

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40
4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Text / Reference Books:

1. Flexible ac transmission systems (FACTS) by Y.H. Song, and Allan T. Johns Institution of Electrical Engineers Press, London, 1999.
2. Concepts and Technology of flexible ac transmission system Hingorani ,L.Gyugyi IEEE Press New York, 2000 ISBN –078033 4588.
3. Thyristor - based FACTS controllers for Electrical transmission systems by R .Mohan Mathur and Rajiv K.Varma IEEE press, Wiley Inter science, ISBN no. 0-471-20643-1, 2002.
4. FACTS controllers for transmission and Distribution systems by K.R.Padiyar New Age international Publishers.

Advanced PID Control

Course Code	:	**EE726 (Elective-III/IV/V/VI/VII/VII)**
Course Title	:	**Advanced PID Control**
Course Credits	:	**4**
Total Hours per Week (L+T+P)	:	**3+0+0**

Course Syllabi (Theory):

Introduction: Feedback fundamentals, PID controller ,Two degree freedom controller, Issues related to implementation- integral windup, Stability, sensitivity functions, robustness to process variations, requirements and specifications.

PID Stabilization: I, PID stabilization – characterization and computation.

PID Controller Design :ZN & related methods, rule based empirical tuning, pole placement, lambda tuning, algebraic design, optimization methods, robust loop shaping, and frequency response methods. IMC based PID tuning. Design for disturbance rejection.

Robust Performance and Performance Assessment: Modeling uncertainty, performance in the presence of uncertainty, robust pole placement, design for robust performance, PID controller performance assessment.

Adaptive PID Control :Autotuning, Adaptive Technique-model based methods-rule based methods, Multimodal based PID Controller design, nonlinear PID Controller design.

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40

4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Text / Reference Books:

1. Karl J. Astrom and Tore Haggland, Advanced PID Control, ISA Publications, 2005.
2. G.J. Silva, Aniruddha datta, SP.Bhattacharyya, PID control for time delay systems, Springer, 2005.
3. Q.G. Wang, Z. Ye, W.J. Cai, C.C. Hang, PID control for Multivariable Process, Springer, 2008.

Communication Systems & Networks

Course Code	:	**EE727 (Elective-III/V/V/VI/VII/VII)**
Course Title	:	**Communication Systems & Networks**
Course Credits	:	**4**
Total Hours per Week (L+T+P)	:	**3+0+0**

Course Syllabi (Theory):

Unit-I :Communication Process, Elements of Communication Systems, Communication channels. Need for modulation, Basic forms of Amplitude Modulation & Demodulation, AM, DSB, SSB-SC.

Unit-II :Fundamentals of FM, PM and its essential features, FM Generation and Demodulation, ASK, FSK, PSK Techniques, and Probability of error. Basic Principles, PAM, PWM, PPM, Basics of PCM, Delta Modulation, ADM & DPCM. Sampling Theorem, FDM & TDM.

Unit-III :Information, Entropy, Channel Capacity, Shannon's Theorem, Shannon Hartley Theorem, Bandwidth - S/N Trade Off. Introduction to source coding, Coding Efficiency, Shannon-Fano Coding and Hoffman Coding, Introduction to the effect of noise on AM & FM systems.

Unit-IV :Introduction to computer communication networks and layered architecture overview,Packet switching and Fast packet switching, Point to Point Protocols and links: ARQ retransmission strategies. Selective repeat ARQ, Framing and standard Data Link Control protocol-HDLC, SDLC, LAPD.

Unit-V :Queuing models in communication networks, Multi-access Communication and multiple access protocols, ALOHA, slotted ALOHA, CSMA, CSMD/CD, and Internetworking issues: Bridges, Routers and Switched networks. Routing and Flow Control algorithms in data networks, Broadband Networks: ATM, Frame relay and Gigabit Ethernet. Traffic Management in ATM networks.

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40
4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Text / Reference Books

1. Haykin S.,"Communications Systems", John Wiley and Sons, 2001.
2. Proakis J. G. and Salehi M., "Communication Systems Engineering", Pearson Education, 2002.
3. Taub H. and Schilling D.L., "Prnciples of Communication Systems",Tata McGraw Hill, 2001.
4. R G Gallager and D Bertsekas, Data Networks, Prentice Hall of India, 1992
5. J F Hayes, Modelling and Analysis of Computer Communication Networks, Plenum Publishing Corporation, New York, 1984.
6. W Stallings, Data and Computer Communications, Prentice Hall of India, 1997.

ELECTRICAL MACHINE DESIGN

Course Code	:	**EE728 (Elective-IV/V/VI/VII/VII)**
Course Title	:	**Electrical Machine Design**
Course Credits	:	**4**
Total Hours per Week (L+T+P)	:	**3+0+0**

Course Syllabi (Theory):

General concepts & considerations of electrical machine design:Factors affecting design and limitations, typical problems giving insight of machine design, nameplate specifications of electrical machines, Heat generation in electrical machines, modes of heat dissipation, Equations for temperature rise in electrical machines under steady state conditions, Heating and cooling time constants, ratings of machine, significance of rating of the design aspects, types of enclosures and their effect on design, Insulation classes & materials.

D.C.Machine: Laws of magnetic circuit, magnetization curves, Calculation of magnetic circuit for a D.C. Machine (air gap irregularities, M.M.F. of tooth section etc.), output equation, calculation of main dimensions, design of armature winding.

Transformer: Features regarding construction of transformer, choice of flux densities for yoke and core, current density, window space factor etc., determination of the main dimensions of the magnetic frame, design of low and high voltage windings, insulation details, calculation of resistance and leakage reactance, Performance calculations relating to design.

Induction Motor: Main dimensions of the stator, Design of stator winding, Stator core, length of air gap, squirrel cage rotor, wound rotor, Performance calculations relating to design.

Synchronous Machines: Main dimensions of the stator, short circuit ratio, length of air gap, Design of stator winding, stator core, field system for salient pole alternator, Introduction to computer aided design.

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40
4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Text / Reference Books:

1. Design of DC Machines : By Clayton
2. Performance and Design of A.C.Machines : By M.G.Say
3. Synchronous machine design : By G.C.Jain
4. Computer aided design : By Say & Sinha
5. Performance & Design of Electrical Machines:By V.N.Mittle & A.Mittal
6. Design of Electrical Machines: By A.K.Sawhney

High Voltage Engineering

Course Code	:	**EE729 (Elective-III/IV/V/VI/VII/VII)**
Course Title	:	**High Voltage Engineering**
Course Credits	:	**4**
Total Hours per Week (L+T+P)	:	**3+0+0**

Course Syllabi (Theory):

Breakdown: Introduction to mechanism of breakdown in gases, Townsend's breakdown mechanism. Breakdown in electromagnetic gases, Application of gases in power system, Introduction to mechanism of breakdown in liquids, suspended solid particle mechanism and cavity breakdown, Application of oil in power apparatus, Introduction to mechanism of breakdown in solids, electromechanical breakdown, treeing & tracking breakdown and thermal breakdown.

High Voltage: Generation of high dc voltage, basic voltage multiplier circuit, Cascaded Transformers for generation of high AC voltage Impulse voltage, basic impulse circuit, Mark's multistage impulse generator, Potential dividers - resistive, capacitive and mixed potential dividers. Sphere gap- Construction and operation, Klydonorgraph.

Nondestructive Insulation Tests: Measurement of resistively, dielectric constant and loss factor, High Voltage Schering Bridge- measurement of capacitance and dielectric loss, Introduction to partial discharge, partial discharge equivalent circuit. Basic wide-band and narrow band PD detection circuits.

Overvoltage and Travelling Waves: Causes of over voltages, introduction to lightning phenomena, over voltages due to lighting, Travelling waves on transmission lines-open end line, short circuited line, line terminated through a resistance, line connected to a cable, reflection and refraction at a T-junction and line terminated through a capacitance, Attenuation of tavelling waves.

Over Voltage Protection & Insulation Coordination: Basic construction and operation of ground wires- protection angle and protective zone, ground rods, counterpoise, surge absorber,

rod gap and arcing horn, lighting arresters - expulsion type, non -linear gap type and metal oxide gapless type, volt - time curves, basic impulse insulation levels, coordination of insulation levels

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40
4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Text / Reference Books:

1. M.S.Naidu and V.Kamraju – High Voltage Engineering, Tata McGraw Hill Publishing, Company, New Delhi
2. C.L. wadhawa -High Voltage Engineering-New Age international (P) Ltd. Publications.
3. Rokosh Das Begamudre- EHV AC. Transmission Engineering, Wiley Easter Ltd. New Delhi.
4. E.Kuffer and M.Abdullaha _High Voltage Engineering, Pergamon

DIGITAL IMAGE PROCESSING

Course Code	:	**CSE728 (Elective III/IV/V/VI/VII)**
Course Title	:	**Digital Image Processing**
Course Credits	:	**4**
Total Hours Per Week (L+T+P)	:	**3 + 0 + 0**

Course Syllabi (Theory):

- Image Processing, The origins of Digital Image Processing, Examples of Fields that use Digital Image Processing, Fundamentals Steps in Digital Image Processing, Components of an Image Processing System.

- Elements of Visual Perception, Light and the Electromagnetic Spectrum, Image Sensing and Acquisition, Image Sampling and Quantization, Some Basic Relationship between Pixels, An Introduction to the Mathematical Tools Used in Digital Image Processing

- Intensity Transformation and Spatial Filtering, Background, Some Basic Intensity Transformation Functions, Histogram Processing, Fundamentals of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters

- Filtering in the Frequency Domain, Concepts, Sampling and the Fourier Transform of Sampled
- Functions, The Discrete Fourier Transform (DFT) of One Variable, Extension to Functions of Two Variables,, Some Properties of the 2-D Discrete Fourier Transform, The Basics of Filtering in the Frequency Domain, Image Smoothing Using Frequency Domain Filters, Image Sharpening Using Frequency Domain Filters.

- Color Fundamentals, Color Models, Pseudocolor Image Processing, Basics of Full-Color Image Processing, Color Transformations, Smoothing and Sharpening.

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40

4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Text Books:

T1. Rafael C Gonzalez, Richard E Woods 2nd Edition, Digital Image Processing - Pearson Education 2003.

Reference Books:

R1. B. Chanda and D. Dutta Majumder, "Digital Image Processing and Analysis", PHI Publication.
R2. Madhuri A. Joshi, "Digital Image Processing – An Algorithmic Approach, PHI Publication.

ARTIFICIAL NEURAL NETWORK

Course Code	:	**CSE722 (Elective III/IV/V/VI/VII)**
Course Title	:	**Artificial Neural Network**
Course Credits	:	**4**
Total Hours Per Week (L+T+P)	:	**3 + 0 + 0**

Course Syllabi (Theory):

- Artificial Neural Networks (ANN) and their biological roots and motivations. ANNs as numerical data/signal/image processing devices. Encoding (training phase) and decoding (active phase).Taxonomy of neural networks: feedforward and recurrent networks with supervised and unsupervised learning laws. Static and dynamic processing systems, Basic data structures: mapping of vector spaces, clusters, principal components.

- A summing dendrite, synapses and their weights, pre- and post-synaptic signals, activation potential and activation function. Excitatory and inhibitory synapses, The biasing input, Types of activating functions, The Perceptron and its learning law, Classification of linearly separable patterns.

- The adaptive linear element, Linear regression, The Wiener-Hopf equation, The Least-Mean-Square (Widrow-Hoff) learning algorithm. Method of steepest descent, Adeline as a linear adaptive filter, A sequential regression algorithm

- Multi-Layer Perceptrons, Supervised Learning, Approximation and interpolation of functions. Back-Propagation Learning law. Fast training algorithms. Applications of multilayer perceptrons: Image coding, Paint-quality inspection, Nettalk.

- Feedback neural networks, Pattern storage and retrieval, Hopfield model, Boltzmann machine, recurrent neural networks

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20

3.	End Term Test	3 hour	40
4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Text Books:

T1. Artifical neural networks - B.Vegnanarayana Prentice Haul of India P Ltd 2005

Reference Books:

R1. Satish Kumar, Neural Networks – A Classroom Approach, Tata McGraw-Hill, 2003
R2. S.Haykin, Neural Networks – A Comprehensive Foundation, Prentice Hall, 1998
R3. C.M.Bishop, Pattern Recognition and Machine Learning, Springer, 2006
R4. Introduction to Artificial Neural Systems Jacek M. Zurada, JAICO Publishing House Ed. 2006.

ROBOTICS

Course Code	:	**CSE721 (Elective III/IV/V/VI/VII)**
Course Title	:	**Robotics**
Course Credits	:	**4**
Total Hours Per Week (L+T+P)	:	**3 + 0 + 0**

Course Syllabi (Theory):

- **Introduction:** Definition, Classification of Robots, Geometric classification and control classification.
- **Robot Elements:** Drive systems, Control systems, sensors, End effectors, Gripper actuators and gripper design.
- **Robot Coordinate Systems and Manipulator Kinematics:** Robot co-ordinate system representation, Transformation, Homogeneous transforms and its inverse, Relating the robot to its world.
- Manipulators Kinematics, Parameters of links and joints, Kinematic chains, Dynamics of kinematic chains, Trajectory planning and control, Advanced techniques of kinematics and dynamics of mechanical systems, Parallel actuated and closed loop manipulators.
- **Robot Control:** Fundamental principles, Classification, Position, path and speed control systems, adaptive control.
- **Robot Programming:** Level of robot programming, Language based programming, task level programming, Robot programming synthesis, robot programming for foundry, press work and heat treatment, welding, machine tools, material handling, warehousing assembly, etc., automatic storage and retrieval system, Robot economics and safety, Robot integration with CAD/CAM/CIM, Collision free motion planning

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40
4.	Class Participation	Day to day	10

5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Text & Reference Books:

1. Robotic Technology (Vol. I-V) Phillipe Collet Prentice Hall
2. An Introduction to Robot Technology Coiffet and Chirooza Kogan Page
3. Robotics for Engineers Y. Koren McGraw Hill
4. Robotics K.S. Fu, R.C. Gonzalez & CSG Lee McGraw Hill International
5. Robotics J.J. Craig Addison-Wesley
6. Industrial Robots Groover, Mitchell Weiss, Nagel Octrey McGraw Hill
7. Robots & Manufacturing Automation Asfahl Wiley Eastern

IC TECHNOLOGY

Course Code	:	**ECE725 (Elective-III/IV/V/VI/VII/VII)**
Course Title	:	**IC Technology**
Course Credits	:	**4**
Total Hours per Week (L+T+P)	:	**3+0+0**

Course Syllabi (Theory):

- Introduction to Semiconductor Physics:Review of quantum mechanics, Electrons in periodic lattices, E-k diagrams, Quasiparticles in semiconductors, electrons, holes and phonons. Boltzmann transport equation and solution in the presence of low electric and magnetic fields - mobility and diffusivity; Carrier statistics; Continuity equation, Poisson's equation and their solution; High field effects: velocity saturation, hot carriers and avalanche breakdown.
- Semiconductor Junctions:Schottky, homo- and hetero-junction band diagrams and I-V characteristics, and small signal switching models; Two terminal and surface states devices based on semiconductor junctions.
- MOS Structures: Semiconductor surfaces; The Ideal and Non-ideal MOS Capacitor band diagrams and CVs; Effects of oxide charges, defects and interface states; Characterization of MOS capacitors: HF and LF CVs, avalanche injection; High field effects and breakdown.
- Characterization of Semiconductors: Four probe and Hall measurement; CVs for dopant profile characterization; Capacitance transients and DLTS.

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40
4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Text Books:

1. S. M. Sze, Physics of Semiconductor Devices, 2nd edition John Wiley, 1981.
2. J. P. McKelvey, introduction to Solid State and Semiconductor Physics, Harper and Row and John Weathe Hill, 1966.

Reference Books:

1. E. H. Nicollian and J. R. Brews, MOS Physics and Technology, John Wiley, 1982

VERILOG HARDWARE DESCRIPTION LANGUAGE

Course Code	:	**ECE726 (Elective-III/IV/V/VI/VII/VII)**
Course Title	:	**Verilog Hardware Description Language**
Course Credits	:	**4**
Total Hours per Week (L+T+P)	:	**3+0+0**

Course Syllabi (Theory):

- Introduction: Fundamental & history of various hardware description languages, Design flow of ASICs and standard logic circuits using software.
- Combinational Circuits Building Blocks: Multiplexer, Decoders, encoders, Code Converters, VHDL Code for Combinational Circuits.
- Sequential Circuits: VHDL code for Flip-Flops, shift registers, counters.
- Synchronous / Asynchronous Sequential Circuits: Mealy & Moore type FSMs, VHDL Code for Mealy & Moore Machines, VHDL Codes for Serial Adder, Vending Machine.
- Digital System Design: Building Block circuits, Memory organization, SRAM, Design examples of divider, Multiplier, Shifting & Sorting Operations, Clock Synchronization, CPU organization and design concepts.

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40
4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Text Books:

1. VHDL: Programming by Examples, Douglas L Perry, McGraw Hill, 4th Edition.
2. A VHDL Primer, JayaramBhaskar, Prentice Hall, 3rd Edition.

Reference Books:

1. Circuit Design with VHDL, Volnei A. Pedroni, MIT Press.

BIOMEDICAL ENGINEERING

Course Code	:	**ECE722 (Elective-III/IV/V/VI/VII/VII)**
Course Title	:	**Biomedical Engineering**
Course Credits	:	**4**
Total Hours per Week (L+T+P)	:	**3+0+0**

Course Syllabi (Theory):

1. PHYSIOLOGY OF SYSTEMS AND ELECTRODES: Brief description of neural, muscular, cardiovascular and respiratory systems; their electrical, mechanical and chemical activities. Biopotential electrode, Active & passive transducers, Biochemical transducers. Resting & action potential, Polarization & depolarization, Propagation & action potential, Bioelectronic potential.
2. CARDIOVASCULAR SYSTEM MEASUREMENTS: Measurement of blood pressure, blood flow, cardiac output, cardiac rate, heart sounds, Electrocardiograph, phonocardiograph, Plethysmograph, Echocardiograph.
3. INSTRUMENTATION FOR CLINICAL LABORATORY: Measurement of pH valve of blood, ESR measurement, hemoglobin measurement, O_2 and CO_2 Concentration in blood, GSR measurement.
4. MEDICAL IMAGING: Diagnostic X-rays, CAT, MRI, thermography, Ultrasonography, medical use of isotopes, endoscopy.
5. PATIENT CARE, MONITORING AND SAFETY MEASURES: Elements of Intensive care monitoring basic hospital systems and components, physiological effect of electric current shock hazards from electrical equipment, safety measures, Standards & practices.
6. THERAPEUTIC DEVICES AND BIOTELEMETRY: Introduction to cardiac pacemakers, defibrillators, ventilators, muscle stimulators, diathermy, heart lung machine, Hemodialysis, Applications of Laser. Real time computer applications

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20

3.	End Term Test	3 hour	40
4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Text Books:

1. T. Cromwell, "Biomedical Instrumentation & Measurements", P

Reference Books:

1. R.S. Khanpur, "Handbook of Biomedical Instrumentation" Tata McGraw Hill..

Mechatronics

Course Code	:	**ME 727 (Elective-III/IV/V/VI/VII/VII)**
Course Title	:	**Mechatronics**
Course Credits	:	**4**
Total Hours per Week (L+T+P)	:	**3+0+0**

Course Syllabi (Theory):

- Introduction about Mechatronics: scope of Mechatronics, application, process control automation and N/c Machines.
- Sensors and Transducers: Introduction, classification, specification, characteristics of transducers, type of transducers displacement, strain, vibration pressure, flow, temperature, force and torque, tactile.
- Hydraulic Pneumatic and Electrical actuators: Pumps and Compressors, control valves and accessories, actuators, fluid power symbols, fluid power systems, switching devices, solenoids, motors.
- Data Acquisition and Control System: Introduction, Quantitizing theory, Analog to Digital Conversion, Digital to Analog (D/A) conversation, transfer function, transient response and frequency response and frequency response, stability criteria.
- Design of Mechatronic systems: Introduction, Automatic front and book and cutting in steel rolling mill, lift control system, CNC lathe, temperature control of a heat treatment furnace, EOT crane control panel, Grey grain separators, electrode arm control in electric arc furnace.

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20

3.	End Term Test	3 hour	40
4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Text Books:

1. Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering, Bolton, W., Pearson Education
2. Mechatronics: Principles, Concepts and applications, Mahalik N.P., Tata McGraw Hill.
3. Mechatronics, HMT Hand Book, Tata McGraw Hill.

Reference Books:

1. Mechatronics, Singh and Joshi, Prentice Hall of India.
2. Mechatronics: Integrated Technologies for Intelligent Machines, Smaili and Mrad, Oxford.
3. Introduction to Mechatronics and Measurement Systems, Alciatore and Histand, Tata McGraw Hill.
4. Mechatronics: Integrated Mechanical, Balasundaram, Wiley India.

Energy Management & Efficiency

Course Code	:	**ME 730 (Elective-III/IV/V/VI/VII/VII)**
Course Title	:	**Energy Management & Efficiency**
Course Credits	:	**4**
Total Hours per Week (L+T+P)	:	**3+0+0**

Course Syllabi (Theory):

- Introduction: Energy sources, energy demand and supply, Energy crisis, future scenario; Energy system efficiency; energy conservation aspects; Instrumentation and measurements.
- Principles of Energy Management and Energy Audit: General principles, planning and program; Introduction to energy audit; General methodology; Site surveys; Energy systems survey, energy audit; Instrumentation; Analysis of data and results.
- Heating and Cooling Management: General principles of energy managements in HVAC systems; Human comforts and health requirements; HVAC systems; Boiler and heat sources; Chillers, fans, pumps, cooling towers, Energy management opportunities; Modelling of heating and cooling loads in buildings.
- Electrical Load and Lighting Management: General principles; Illumination and human comfort; Lighting systems;
- Equipments; Energy management opportunities; Electrical systems; Electrical load analysis; Peak load controls.
- Process Energy Management: Principles; Process heat, Combustion, Automatic fuel controls; Steam generation and
- Distribution, Hot water and pumping, Furnaces and ovens; Process electricity; Compressed air; Manufacturing process;
- Energy storage for process industries; Process control.
- Integrated Building systems: General principles; Environment conformation; Passive design considerations; Building

- Envelope design consideration, Integration of building system, Energy storage-cold storage techniques, Economic analysis.
- Economic Aspects of Energy Management: General considerations; Economic analysis methods; Life-cycle costing,
- Break even analysis, benefit cost analysis, payback period analysis, present worth analysis, equivalent annual cost analysis,
- Use of computers; Management of energy with environment aspects.

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40
4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Text book:

1. Rural Energy Management S Kaushik, T Verma Deep and Deep Publs.

2. Energy Management W R Murphy; G Mckay B.S. Publications

References:

3. Renewable Energy and Energy Management S C Patra; B C Kurse; R Kataki International Book Co.

4. Operations and Maintenance Manual for Energy.

Total Quality Management

Course Code	:	**ME 724 (Elective-III/IV/V/VI/VII/VII)**
Course Title	:	**Total Quality Management**
Course Credits	:	**4**
Total Hours per Week (L+T+P)	:	**3+0+0**

Course Syllabi (Theory):

- The meaning of Quality and quality improvement, dimensions of quality, history of quality methodology, quality control, Quality of design and quality of conformance, Quality policy and objectives, Economics of quality. Modeling process quality: Describing variation, frequency distribution, continuous and discrete, probability distributions, pattern of variation, Inferences about process quality: sampling distributions and estimation of process parameters. Analysis of variance, statistical aids in limits and tolerances.
- Statistical Quality Control: Concept of SQC, Chance and assignable causes of variation, statistical basis of control chart, basic principles, choice of control limits, sample size and sampling frequency, analysis of patterns on control charts. The magnificent seven. Control chart for variables,: X-bar and R charts, x-bar and S charts, control chart for individual measurement. Application of variable control charts.
- Control chart for attributes: control chart for fraction non-conforming P-chart, np-chart, c- chart and u-chart. Demerit systems, choice between attribute and variable control chart. SPC for short production runs. Process capability analysis using histogram and probability plot, capability ratios and concept of six sigma.
- Quality Assurance: Concept, advantages, field complaints, quality rating, quality audit, vendor quality rating (VQR), vendor rating (VR), manufacturing planning for quality, Quality function deployment (QFD).
- Acceptance Sampling: Fundamental concepts in acceptance sampling, operating characteristics curve. Acceptance sampling plans, single, double and multiple sampling

plans, LTPD, AOQL, AOQ. Introduction to Quality systems like ISO 9000 and ISO 14000

- Design of experiments: Strategy of experimentation; Basic principles, Guidelines for designing experiments. Simple Comparative Experiments: Basic statistical concepts, Sampling and sampling Distribution, Inferences about the Differences in means, randomized designs, Paired comparison
- Designs, Inferences about the Variances of Normal Distributions. Introduction to Taguchi Method of Design of Experiments, Quality loss function, Signal-to- Noise ratio, Orthogonal array experiments.

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40
4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Text Books:

1. Fundamentals of Quality Control and Improvement, Amitava Mitra, 2 Edition, Prentice Hall, 1998
2. Introduction to Statistical Quality Control, Douglas C. Montgomery, 2 Edition, Wiley, 1991.

Reference Books:

1. Quality Planning and Analysis, J.M.Juran and F.M. Gryna, McGraw Hill
2. Quality Control, Dale H. Besterfield, 8 Edition, Pearson/Prentice Hall, 2008.
3. Statistical Quality Control, E. L. Grant and Richard S. Leavenworth, Tata McGraw-Hill, 2000.
4. Design and Analysis of Experiments, 5 Edition, Douglas C. Montgomery, Wiley-INDIA, 2007.

Renewable Energy Resources

Course Code	:	**ME 733 (Elective-III/IV/V/VI/VII/VII)**
Course Title	:	**Renewable Energy Resources**
Course Credits	:	**4**
Total Hours per Week (L+T+P)	:	**3+0+0**

Course Syllabi (Theory):

- Global and National scenarios, Form and characteristics of renewable energy sources.
- Solar Energy: Solar radiation, its measurements and prediction, Solar thermal collectors, flat plate collectors, concentrating collectors, Basic theory of flat plate collectors, solar heating of buildings, solar still, solar water heaters, solar driers, conversion of heat energy in to mechanical energy, solar thermal power generation systems.
- Solar Photovoltaic: Principle of photovoltaic conversion of solar energy, types of solar cells and fabrication, Photovoltaic applications: battery charger, domestic lighting, street lighting, water pumping, power generation schemes.
- Wind Energy: Atmospheric circulations, classification, factors influencing wind, wind shear, turbulence, wind speed monitoring, Betz limit, WECS- classification, characteristics, applications.
- Ocean Energy: Ocean energy resources, ocean energy routes, Principles of ocean thermal energy conversion systems, ocean thermal power plants, Principles of ocean wave energy conversion and tidal energy conversion.
- Other Sources: Nuclear fission and fusion, Geothermal energy- Origin, types of geothermal energy sites, site selection, geothermal power plants, Magneto-hydro-dynamic (MHD) energy conversion, Formation of biomass, photosynthesis, Biomass resources and their classification, Chemical constituents and physicochemical characteristics of biomass, Biomass conversion processes.
- Fuel Cells: Thermodynamics and electrochemical principles, Basic design, types, applications.
- Hydrogen Energy: Economics of hydrogen, Production methods.

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40
4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Text books:

1. Power Generation through Renewable Source of Energy, Rai and Ram Prasad, Tata McGraw-Hill, New Delhi.
2. Renewable Energy Sources and Conversion Technology, Bansal, Kleemann and Meliss, Tata McGraw Hill,

   New Delhi.

References:

1. Solar Energy: Fundamental and Applications, H. P. Garg J Prakash, Tata McGraw-Hill.
2. Solar Energy: Principles of Thermal Collection and Storage, S P Sukhatme, Tata McGraw-Hill.

SEMINAR

Course Code	:	**SEM701**
Course Title	:	**Seminar**
Course Credits	:	**2.5**
Total Hours per Week (L+T+P)	:	**0 + 0 + 4**

Course Syllabi (Theory):

Operation Procedure

1. Student has to devote full semester for SEM701 course.
2. Student has to report to the Supervisor regularly.
3. Seminars s evaluation has to be carried out in the presence of a two member Committee comprising.
4. Experts in the relevant area constituted by the Supervisor.

Final Seminar Report to be submitted has to be in formal hard bound cover bearing of the Institute emblem.

Reference Books:

Based on literature survey to be done with peer reviewed journals and magazines.

Evaluation Scheme (Theory):

S. No.	Evaluation Component	Duration (Hours)	Marks (100)	Nature of Component
1.	Presentation	Weekly	25	Open Book
2.	Report(Soft Copy)	Weekly	25	Open Book
3.	Assignment	Continuous	10	Open Book
4.	Final Presentation		20	Open Book
5.	Final Report(Hard Copy)		20	Open Book

Hari Ben

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INSTITUTE OF ENGINEERING AND TECHNOLOGY

4 Year B. Tech Programme

(Branch: Electrical Engineering)

Batch 2012-2016

SEMESTER-EIGHTH

Detailed Syllabus

&

Scheme of Examination

CONTENTS

PRACTICE SCHOOL – II

Course Code	:	**PS801**
Course Title	:	**Practice School – II**
Course Credits	:	**16**
Duration	:	**Five and Half Months**

Course Syllabi:

This course is for five and half months (summer and one semester) in VII or VIII Semester. The objective of this programme is to provide the students, an opportunity to work on live projects of corporate world in various fields. During this programme, they will work on real world applications of their curricula through organizational function of their choice. The students are expected to be involved directly in problem solving efforts of specific interest to the host organization. The learning of PS-I will help them in completing PS-II successfully.

Evaluation Scheme:

S. No.	Evaluation Component	Marks (100) (Weightage %)
1	Quiz-I	4
2	Quiz-II	4
3	Group Discussion-I	4
4	Group Discussion-II	4
5	Seminar-I	4
6	Seminar-II	4
7	Diary-I	4
8	Diary-II	4
9	Observation-I	4
10	Observation- II	4
11	Mid Term Evaluation (Project Report and Presentation/Viva)	20
12	Final Evaluation (Project Report and Presentation/Viva)	40

Department of Electrical and Electronics Engineering, IET, JKLU, Jaipur

Corrigendum of Course Booklet

Programme Name: B.Tech. Electrical Engineering

Batch: 2012-16

Code Change: Workshop Practice (ME102 to ME141)

Credit Change: 1. ECE402 (5.5 to 7)

Missing Syllabus:

1. EE501 linear control Systems

2. EE502 Power System Switchgear and protection.

3. EE601 Generation of Electrical Power

4. ME730 Energy Management and Efficiency

Any Other Discrepancy:

1. In detailed syllabus ME241 Machine Drawing course credit change from 02 to 03.

2. Rename the subject EE301 Network Analysis and Synthesis to EE301 Electrical Network Analysis and Synthesis.

6. In semester 2nd total credit 38.5 changed to 40.

6. Total credit of course structure from 220 to 221.5.

Signature