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

Approved for implementation

27.12.2013
Vice Chancellor

JK LAKSHMIPAT UNIVERSITY
ज्ञानम् अमृतम्

JK Lakshmipat University

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

Ph.: +91-141-7107500/504

INSTITUTE OF ENGINEERING AND TECHNOLOGY

B. Tech (2014-18)

4 Years Degree Programme

(Branch: Electrical Engineering)

Semester – I - VIII

Curriculum, Detailed Syllabus

&

Scheme of Examination

Academic Council Meeting (23.12.2013)

JK Lakshmipat University, Jaipur
Institute of Engineering and Technology
Department of Electrical Engineering
Course Structure for the Batch 2014-18

Semester	Courses								(L T P) Credits / Hrs/ Week
I	English Communication Skills	Engineering Mathematics - I	Engineering Chemistry	Electrical & Electronics Engineering	Workshop Practice	Engineering Drawing			(13 3 9) 20.5
	LA101 (2 1 0) 3	MA101 (3 1 0) 4	CH101 (3 1 2) 5	EE101 (3 0 2) 4	ME141 (0 0 3) 1.5	CE102 (2 0 2) 3			25
II	Professional Communication Skills	Engineering Mathematics - II	Engineering Physics	Environmental Studies	Engineering Mechanics	Computer Programming			(15 4 6) 22
	LA201 (1 1 2) 3	MA201 (3 1 0) 4	PH101 (3 1 2) 5	ID201 (2 0 0) 2	ME201 (3 1 0) 4	CSE201 (3 0 2) 4			25
III	Network Analysis & Synthesis	Electrical Machines –I	Electronic Devices & Circuits	Electromagnetic Field Theory	Engineering Mathematics – III	Principles of Management for Engineers			(17 5 6) 25
	EE301 (3 1 2) 5	EE302 (3 1 2) 5	ECE301 (3 1 2) 5	ECE303 (3 1 0) 4	MA301 (3 1 0) 4	HS302 (2 0 0) 2			28
IV	Electrical Machines – II	Transmission & Distribution of Electrical Power	Digital Electronics	Measurements & Instrumentation	Conventional Energy Sources	Numerical & Statistical Methods			(18 3 8) 25
	EE401 (3 1 2) 5	EE402 (3 1 0) 4	ECE402 (3 1 2) 5	ECE406 (3 0 2) 4	EE403 (3 0 0) 3	MA402 (3 0 2) 4			29
V	**Practice School - I (PS 501) – (4 to 6 Weeks Duration) - 4 Credits**								
	Linear Control Systems	Power System Switchgear & Protection	Modeling & Simulation	Linear Integrated Circuits	Engineering Signals & Systems	Elective – I			(18 4 8) 26+4
	EE501 (3 1 2) 5	EE502 (3 1 2) 5	EE503 (3 0 2) 4	ECE501 (3 1 2) 5	ECE505 (3 1 0) 4	(3 0 0) 3			30
VI	Non-conventional Energy Sources	Power System Analysis	Industrial Electronics	Digital Signal Processing	Microprocessors & Interfacing	Elective – II			(18 4 8) 26
	EE604 (3 1 0) 4	EE602 (3 1 2) 5	EE603 (3 1 2) 5	ECE603 (3 1 2) 5	ECE622 (3 0 2) 4	(3 0 0) 3			30
VII	Electrical Drive & Control	High Voltage Engineering	Testing and Commissioning of Electrical Machines	Elective – III	Elective – IV	Seminar	Principles of Economics		(18 4 6) 25
	EE 701 (3 1 0) 4	EE 702 (3 1 0) 4	EE 703 (3 1 2) 5	(3 1 0) 4	(3 0 0) 3	SEM701 (0 0 4) 2	HS701 (3 0 0) 3		28
VIII	**Practice School – II (PS 801) – (16 Weeks Duration) - 16 Credits**								16

List of Elective Courses

Elective I	Advanced Distribution System (EE 522)		Management Information System (CSE521)		Electrical and Electronic Engineering Materials (EE 521)			
Elective II	Restructured Power System (EE622)		Power System Transients (EE621)		Engineering Optimization (MA621)			
Elective III	Power Quality& Utilization of Electrical power (EE 721)		Flexible AC Transmission System (EE723)	Advanced PID Control (EE724)	Electrical Machine Design (EE725)	Communication Systems & Network (EE726)	High Power Semiconductor devices (EE722)	
Elective IV	Digital Image Processing (CSE721)	IC Technology (ECE 725)	Verilog Hardware Description Language (ECE 726)		Biomedical Engineering (ECE 722)	Information Theory and Coding ECE729		

Total Credits: 189.5

06/01/14

JK Lakshmipat University

Laliya Ka Vas, P.O. Mahapura, Ajmer Road, Jaipur 302026

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INSTITUTE OF ENGINEERING AND TECHNOLOGY

4 Year B. Tech Programme

(Branch: Electrical Engineering)

Batch 2014-18

SEMESTER-ONE

Detailed Syllabus

&

Scheme of Examination

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
LA 101	English Communication Skills	2	1	0	3

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	-	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Syllabus (Theory)

- Definition and Characteristic Features of Effective Communication
- Barriers to Communication: Types, Ways to Overcome
- Vocabulary Extension: Roots, Prefixes and Suffixes
- Vocabulary Extension: Synonyms, Antonyms, Homophones, One Word Substitution
- Vocabulary Extension: Learning words through Situations
- Basics of English Grammar
- Applied English Grammar and Standard English Usage
- Standard English Usage, Listening Skills
- Phonetics and Spoken English: Sounds of English, Word Accent and Weak Forms in English, Intonation
- Introducing students to the rules of Word Accent and Weak Forms in English
- Reading Comprehension: Problems, Types of Reading Skills, Strategies
- Paragraph Writing: Definition, Structure of a Paragraph, Construction of a Paragraph, Unity and Coherence
- Art of Condensation: Steps Required, Strategies

Text Book(s)

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

Reference Book(s)

2. Meenakshi Raman and Sangeeta Sharma, *Technical Communication: Principles and Practice*, Second Edition, New Delhi: OUP, 2011.
3. Krishna Mohan and Meenakshi Raman, *Effective English Communication*, New Delhi: Tata-McGraw Hill, 2000.
4. Krishna Mohan and N.P.Singh, *Speaking English Effectively,* New Delhi: Macmillan,1994.
5. V. Sasikumar and P.V. Dhamija, *Spoken English: A Self-Learning Guide to Conversation Practice*, Tata-McGraw Hill, 2007.
6. Norman Lewis, Word Power Made Easy, Delhi: GoyalSaab Publishers and Distributors, 1994.
7. A.J.Thomson and A.V.Martinet, A Practical English Grammar, 4th Edition, New Delhi: OUP, 1999.
8. Asha Kaul, Business Communication, Second Edition, New Delhi: PHI, 2010.
9. Edgar Thorpe and Showick Thorpe, Objective English, 2nd Edition, New Delhi: Pearson Education, 2008.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MA 101	Engineering Mathematics – I	3	1	0	4

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks
20	20	40	10	10	100	-	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Syllabus (Theory)

Unit 1: Calculus of several variables

Functions of two or more variables, Partial Derivatives, Total derivative, chain Rule, Euler's Theorem, Jacobian and transformation, Applications to errors, Optimization using derivatives - Maxima-Minima of functions of two variables, Lagrange's method.

Unit 2: Curve Sketching

Asymptotes, Double and Triple Points, Cartesian, parametric and polar curve sketching

Unit 3: Vector function and its derivatives

Vector functions, their derivatives and integration, Arc length and unit tangent vector, Curvature and unit normal vector, Torsion and unit Bi-normal vector, Directional derivative and gradient vectors, Tangent plane, Divergence and curl of a vector field

Unit 4: Integral Calculus

Definite Integral - Integral calculus, Line integral, Arc length, Solids of revolution: Surface and volume, Multiple Integrals - Double integral: Area, change of order of integration, changing to polar coordinates, Triple integral, Volume integral, Improper Integrals - Gamma and Beta functions

Unit 5: Vector Integration

Line integral, flux, work done, circulation, Path independence, potential function and conservative fields, Green's theorem in the plane, Stoke's theorem, Divergence theorem,
Sequence and Series: Sequence, Series, Orthogonal function, Fourier Series

Text books and Reference books

1. B. S. Grewal, *Higher Engineering Mathematics*, 41st Ed., Khanna Publishers, Delhi, 2011.
2. G.B. Thomas, Jr., *Thomas' calculus*, 11th edition (Indian), Pearson education, Delhi, 2008
3. Dennis G. Zill and Warren S. Wright, *Advanced Engineering Mathematics*, Fourth Edition (Student Edition), Jones & Barlett, Viba, New Delhi, 2011
4. Rober Wrede, Spiegel M. R., *Schaum's outline of advanced calculus*, 3rd edition, Tata Mc-GrawHill, NewYork, 2011
5. Peter V. O'Neil, *Advanced Engineering Mathematics*, Seventh Indian Reprint, Cengage Learning, New Delhi, 2011.
6. Kreyszig, E., *Advanced Engineering Mathematics*, John Willey, Delhi (2011).
7. Potter M.C., Goldberg J.L., Edward F.A., *Advanced Engineering Mathematics*, 3rd Edition, Oxford University Press, 2005.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
CH 101	Engineering Chemistry	3	1	2	5

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks*
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

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

Syllabus (Theory)

UNIT-I Water Chemistry

Introduction, common Impurities in water, Hardness of water, Determination of hardness by Clark's test and complexometric (EDTA) method. Removal of hardness by Lime Soda, Zeolite and Ion exchange process.

Boiler feed water: troubles their causes, disadvantages and prevention, Scale & Sludge Carry over (Priming and Foaming), Boiler Corrosion and Caustic embrittlement.

UNIT-II Polymers

Introduction to Polymer, Classification of polymers. Methods of Polymerization, Plastics: Thermosets and Thermoplastic. Preparation, properties and uses of Vinyl resins, Bakelite, Polyesters and Nylons. Rubbers: Natural rubber, vulcanization, synthetic rubbers e.g. Buna-S, Buna-N, Butyl, Thiokol and Neoprene rubbers.

UNIT-III Corrosion &Lubricants

Definition and its significance, Theories of corrosion: Dry corrosion theory, Wet (Electrochemical) theory, Passivity, Types of electrochemical corrosion. Factors influencing rate of corrosion.

Introduction, classification and uses of lubricants. Types of lubrication. Viscosity & viscosity index, Flash point Fire point, cloud and pour point, steam emulsification number, precipitation number and neutralization number.

UNIT-IV Solid State Chemistry

Solid State, Types of solids, Space Lattice and Unit cell, Types of unit cell, Cubic System – Number of atoms per unit cell, Atomic Radius, Density Calculation of unit cell. Bragg's Law X-ray studies of Crystals.

Graphite – Structure, Properties and applications.

Liquid Crystal: Liquid Crystalline state, Classification of liquid crystal and their applications.

UNIT-V Engineering Materials

Cement: Definition, Composition basic constituents and their significance, manufacturing of Portland cement by Rotary Klin technology. Setting and hardening of cement and role of gypsum.

Nanotechnology and Nano materials: Fullerenes and Carbon Nano tubes - Introduction, Structural properties, preparation and their applications.

Syllabus (Practical)

1. To determine the hardness of water by complex metric method using EDTA.
2. To determine the strength of NaOH and Na2CO3 in given alkali mixture.
3. To determine the strength of copper sulphate with the help of Hypo solution.
4. Measurement of conductivity of given sample by conductivity meter.
5. Measurement of pH of given sample by pH meter.
6. Determination of Barium as barium sulphate gravimetrically.
7. Measurement of Fluoride in water sample.
8. Determination of Na/K/Ca by Flame photometer in a given sample.
9. To determine the amount of free chlorine in given sample.
10. To determine the viscosity of a given sample of lubricant oil at various temperature.
11. To determine flash and fire point of a given lubricant using Pensky-Martin's apparatus.
12. Measurement of Nitrate and Oxygen in water sample.
13. To determine cloud and pour point of a given sample of lubricating oil using Cloud and Pour point apparatus.

Text Book

1. Engineering Chemistry by Jain & Jain (Dhanpat Rai publication)

Reference Book(s)

1. Engineering Chemistry by B Sivasankar, (Mc-Graw Hill publication).
2. Engineering Chemistry by O.G. Palanna, (Mc-Graw Hill publication).
3. Engineering Chemistry (Wiely India publication).
4. Introduction to Nanotechnology by Poole Owens (Wiley)
5. Nanotechnology by Shah&Shah (Wiley)
6. *Chemistry* in *Engineering* & Technology by J. C. Kuriacose and J. *Rajaram*,, Vol. 1&2
7. The Physics and Chemistry of Solids by Elliott (Wiley)
8. Engineering Chemistry (Wiely India publication).
9. Polymer Chemistry by Stevens (Oxford)
10. Polymer Science and Technology by Ghosh (Tata Mc-Graw Hill publication)
11. Polymer Science and Technology by Fried (PHI publication)
12. Text book of Polymer Science by Billmeyer (Wiely)

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
EE101	Electrical & Electronics Engineering	3	0	2	4

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

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

Syllabus (Theory)

UNIT I

INTRODUCTION: basic physical laws, circuit elements, Source Transformation, KVL, KCL, Wye (Y) – Delta (Δ) and Delta (Δ) – Wye (Y) transformations.

UNIT II

THEOREM: Norton, Thevenin, Superposition, Max power transfer Theorem

UNIT II

AC NETWORKS: Fundamental aspects of single phase ac supply, Sinusoidal Steady State, Real/Reactive Power, Phasor, Three phase circuits, Start-delta, Two watt-meter Method, simple circuits, RMS Average value, Transients in R-L, R-C, R-L-C.

UNIT IV

TRANSFORMER & MACHINE: Basics of transformer Faraday and Lenz law, Mutual Inductance, construction, Working Principles of Transformers, AC/DC machines.

UNIT IV

INTRODUCTION TO SEMICONDUCTORS: Defining Insulator, Semiconductor, Conductors. Band gap energy and band formation, elementary idea about semiconductor behavior, conductivity, types of semiconductor, p-type and n-type, working principle, characteristics and applications of Diode and Transistor, Transistor CE, CB, CC configuration.

Syllabus (Practical)

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 earthling 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.

Text Book(s)

1. S.N.Singh "Basic Electrical Engineering", Prentice-Hall of India Pvt. Ltd, 2011.
2. J. Millman and C. Halkias, Integrated Electronics, McGraw Hill,2th Edition, 6th Indian Reprint, 2011.
3. B. L. Theraja, "Electrical Technology", Vol.1, S. Chand Publication, New Delhi
4. V. K. Mehta, "Basic Electrical Engineering", S. Chand and Company Ltd., New Delhi

Reference Book(s)

1. T.K.Nagsarkar,M.S. Sukhija,"Basic Electrical Engineering", Oxford University press, 2nd edition, 2011.
2. A.S. Sedra and K.C. Smith, Microelectronic Circuits, Saunder's College Publishing, 1991.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
ME 141	Workshop Practice	0	0	3	1.5

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
-	-	-	-	-	-	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

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

Syllabus (Practical)

- Basics of manufacturing, types of production systems, ethics, safety in workshop.
- Metrology, quality, Least Count of a measuring Instrument, measurement with Vernier Caliper or Micrometer.
- Machining – Demonstration of Turning, Step Turning, Facing, etc.
- Casting – Demonstration of sand casting process
- Forging – Demonstration of forging operations
- Sheet metal working applications.
- Hands on practice of Sheet metal working operations using hand tools- Preparation of Funnel.
- Gas Welding, Demonstration of Gas Welding
- Hands on practice of Joining of metal parts by Arc Welding- Preparation of a Lap Joint model.
- Mechanical joining processes, Arc Welding
- Hands on practice of Joining of metal parts by Arc Welding- Preparation of a Butt Joint model.
- 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, Mechanical joining processes, Soldering, Brazing.
- Machining – Demonstration of Shaping operations
- Hands on practice of Fitting operations using hand tools- Prepare a job in fitting shop.

Text Books:

1. H S Bawa, "Workshop Practice", TMH, New Delhi, 2nd Edition, 2011
2. B S Nagendra Parashar and R K Mittal, "Elements of Manufacturing Process", Prentice Hall of India, New Delhi, 2010 print
3. B S Raghuwanshi, "A Course in Workshop Technology", Dhanpat Rai & Co., New Delhi, Volume I & II, 2011 reprint,
4. Serope Kalpakjian and Steven R. Schmid, "Manufactuirng Engineering and Technology," Pearson Education (Low Cost Indian Edition), New Delhi, 4th Edition, 2005

Reference Books:

1. K. Venkata Reddy, "Workshop Practice Manual", BS Publications, Hyderabad,6th Edition, 2011 print
2. P. kannaiah and K. L. Narayana, "Engineering Practices Laboratory", SciTech Publications, Chennai, 2006

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
CE 101	Engineering Drawing	2	0	2	3

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

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Syllabus (Theory)

Unit I

Lines, Lettering & Dimension (Sketch Book)

Scales: Representative factor, plain scales, diagonal scales, scale of chords.

Conic sections: Construction of ellipse, parabola, & hyperbola by different methods; Engineering Curves: Cycloid, Epi-cycloid, Hypo-cycloid, Involutes, Archimedean and logarithmic spirals.

Unit II

Projection: Types of projection, orthographic projection, first and third angle projection, (Sketch Book)

Projection of points and straight lines: Line inclined to one plane, inclined with both the plane, methods for determining True Length, true Inclinations, and Traces of straight lines.

Unit III

Projection of planes and solids: Projection of Planes like circle and polygons in different positions; Projection of right and regular polyhedrons like prisms, pyramids and solids of revolutions like cylinder, cones in different positions.

Unit IV

Section of Solids: Section of right solids (like Prism, Pyramid, Cylinder and Cone) by normal and inclined planes in different positions; Intersection of cylinders.

Development of Surfaces: Parallel line and radial-line method for right, regular solids.

Unit V

Isometric Projections: Isometric scale, Isometric axes, Isometric Projection of solids from orthographic drawing.

Computer Aided Drafting (CAD): Introduction, benefit, software's basic commands of drafting entities like line, circle, polygon, polyhedron, cylinders; transformations and editing commands like move, rotate, mirror, array; Draw Toolbar, Object & Modify toolbar; solution of projection problems on CAD.

Syllabus (Practical)

Sketching and drawing of geometries and projections on Sketch Book & on AutoCAD based on above syllabus

Text Books:

1. 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.
2. Bhatt N D, Engineering Drawing, Charotar Book Stall, Anand, India.

Reference Books:

1. Jolhe D A, Engineering Drawing with an introduction to AutoCAD, TMH, New Delhi, India.
2. Gill P S, Engineering Drawing (Geometrical Drawing), S K Kataria & Sons, Delhi, India
3. Jeyopoovan T.; Engineering drawing & Graphics Using AutoCAD; Vikas publishers.
4. Engineering Drawing, Basant Agarwal & CM Agarwal, Tata McGraw Hill.
5. Shah MB and Rana BC; Engg.drawing; Pearson Education
6. Luzadder WJ and Duff JM; Fundamental of Engg Drawing; PHI
7. Dhananjay A Jolhe; Engg. Drawing an Introduction; Tata McGraw Hill.
8. Visvesvaraya Tech. University; A Premier on Computer Aided Engg drawing; VTU Belgaum
9. Venugopal K.; Engineering Graphics; New Age

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INSTITUTE OF ENGINEERING AND TECHNOLOGY

4 Year B. Tech Programme

(Branch: Electrical Engineering)

Batch 2014-18

SEMESTER-TWO

Detailed Syllabus

&

Scheme of Examination

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
LA 201	Professional Communication Skills	1	1	2	3

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

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

Syllabus (Theory)

- Professional Communication: Definition, Types, Process, Features
- Importance of Non-Verbal Communication: Eye contact, Facial Expressions, Gestures, Posture, Proxemics, etc.
- Importance of Paralinguistic Features: Voice, Volume, Pitch, Intonation, Pauses, Rate, Vocalized Pauses and Vocal Cues.
- Group Discussion: Purpose, Difference between GD and Debate, Personality Traits to be Evaluated, dynamics of Group Behaviour, Opening and Ending a GD
- Job Interviews: Process, Stages, Desirable Qualities, Steps to Preparation, Body Language, Confidence, Frequently Asked Questions
- Presentation Skills: Combating Nervousness and Stage Fright, Beginning and Ending of a Presentation, Dynamics of Team Presentations, Using Slides and Audio-Visual Aids
- Business Letters and Resume: Structure, Style, Types
- Business Reports: Types, Features, Structure, Style
- E-mail Writing, Other Business Writings
- Editing and Proofreading

Syllabus (Practical)

1. Sounds of English: Vowel and Consonant Sounds, Word Stress, Intonation - Listening and Practice
2. Reading Comprehension: Reading Passages and Answering Questions
3. Vocabulary Extension: :Learning Words through Situations and Modules
4. Presentation Skills: Learning through Video Presentations
5. Group Discussion: Learning through Recorded Group Discussions
6. Job Interviews: Learning through Recorded Job Interviews

Text Book(s)

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

Reference Book(s)

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.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MA 201	Engineering Mathematics – II	3	1	0	4

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks
20	20	40	10	10	100	-	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Syllabus (Theory)

Unit 1: 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.

Unit 2: Partial differential equation

Partial Differential Equations of First Order, Variable separable technique for solving PDE, Boundary value problems: Heat equation, wave equation, Laplace equation

Unit 3: 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

Unit 4: 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

Unit 5: Linear Programming Problems

Introduction to LP Problems, LP formulations, Graphical Methods, Convex Sets, Simplex Methods

Text books and Reference books

1. B. S. Grewal, *Higher Engineering Mathematics*, 41st Ed., Khanna Publishers, Delhi, 2011.
2. Dennis G. Zill and Warren S. Wright, *Advanced Engineering Mathematics*, Fourth Edition (Student Edition), Jones & Barlett, Viba, New Delhi, 2011.
3. B.V.Ramana, *Higher Engineering Mathematics*, Tata Mc-graw Hill.
4. Peter V. O'Neil, *Advanced Engineering Mathematics*, Seventh Indian Reprint, Cengage Learning, New Delhi, 2011.
5. Kreyszig, E., *Advanced Engineering Mathematics*, John Willey, Delhi (2011).
6. Potter M.C., Goldberg J.L., Edward F.A., *Advanced Engineering Mathematics*, 3rd Edition, Oxford University Press, 2005.
7. G.B. Thomas, *Jr., Thomas' Calculus*, 11th edition (Indian), Pearson education, Delhi, 2008.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
PH 101	Engineering Physics	3	1	2	5

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

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

Course Syllabi (Theory):

- **Coherence, Interference and Optical Technology**
  - Introduction to optics, Spatial Coherence, Temporal coherence, Coherence length, Coherence time and 'Q'factor for light
  - Formation of Newton's rings, Measurement of wavelength of light, Diameter of Newton's rings
  - Elementary idea of anti-reflection coating and interference filters
- **Diffraction**
  - Single slit diffraction, position of maxima / minima and width of central maximum, intensity variation.
  - Construction and theory. Formation of spectra by plane transmission grating, Determination of wavelength of light using plane transmission grating.
- **Polarization**
  - Plane, circular and elliptically polarized light on the basis of electric (light) vector, Malus law.
  - Quarter and half wave plates, construction, working and use of these in production and detection of plane, circular and elliptically polarized light.
  - Introduction and law of optical rotation, specific rotation and its measurement using the half-shade and bi-quartz device.
- **Quantum Mechanics**
  - Heisenberg's Uncertainty Principle, Wave and Particle Duality of Radiation, De-Broglie's Concept of Matter waves, Quantum Nature of Light
  - Concept of Compton Effect
  - Concept of Wave Function, Physical interpretation of wave function and its properties
  - Schrödinger's Wave Equation: Time dependent and time independent cases

- **Application of Schrodinger Equations and Band Theory of Solids**
    - Particle in one-dimensional box
    - Particle in three-dimensional boxes, Degeneracy.
    - Barrier penetration and tunnel effect, Tunneling probability
    - Sommerfeld Free Electron Gas Model of Solids.
    - Distinction between Insulators, Semiconductors and Conductors, Intrinsic and Extrinsic Semiconductors.
- **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
    - Relativity of Length, 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.

Course Syllabi (Practical):

1. To determine the wave length of sodium light by Newton's Ring
2. To determine the specific rotation of Glucose (Sugar) solution using a Polarimeter
3. To measure the Numerical Aperture of an Optical Fibre.
4. To determine coherent length and coherent time of laser using He-Ne Laser
5. To determine the height of object with the help of a Sextant.
6. 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.
7. To determine the wave length of prominent lines of mercury by plane diffraction Grating with the help of spectrometer.
8. To study the Charge & Discharge of a condenser and hence determine time constant (Both current and voltage graphs are to be plotted).
9. To determine the high resistance by method of leakage, using a Ballistic Galvanometer.
10. To study characteristics of G.M. Counting System.
11. To determine the specific resistance of the material of a wire by Carey Fosters Bridge.

12. To convert a Galvanometer in to an ammeter of range 1.5/3 amp and calibrate it.
13. To convert a Galvanometer in to a Volt of range 1.5/3 volt and calibrate it.

Text Books:

1. G.D. Ladiwala and S. S. Sharma, "Engineering Physics-I" New Age International Publication, New Delhi, I edn. 2010.
2. G.D. Ladiwala and S. S. Sharma, "Engineering Physics-II" New Age International Publication, New Delhi, I edn. 2010.
3. Lab Manuals for Physics

Reference Books:

1. Arther Beiser, "Concept of Modern Physics" Tata McGrawHill, New Delhi, 5th edn. 1997.
2. Ajoy Ghatak, "Optics", Tata McGraw Hill, 4th edn
3. Eyvind H Wichman, "Quantum Physics" Tata McGraw Hill, Volume 4
4. Neeraj Mehta, "Applied Physics for Engineers", PHI, I edn. 2011
5. Dattu R Joshi, "Engineering Physics", Tata McGraw Hill Education Pvt. Ltd. New Delhi, I edn. 2010.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
ID 201	Environmental Studies	2	0	0	2

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	-	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Course Syllabi (Theory):

- Understanding environment, The global crisis, Basic Concepts
- Forest and Grassland ecosystems, Desert Ecosystems, Aquatic Ecosystems
- Introduction to Biodiversity, Biodiversity Conservation
- Water Resources, Energy Resources, Forest Resources
- Land, Food, and Mineral Resources
- Air and Noise Pollution, Water, Soil, and Marine Pollution
- Solid Waste Management and Disaster Management
- Population Growth, Environment and Human Health, Sustainable Development
- Global Warming, Acid Rain, and Ozone Depletion
- Different types of laws and regulations

Text Books:

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

Reference Books:

1. Ranjit Daniels & J. Krishnaswamy "Environmental Studies", Wiley India
2. Davis & Cornwell "Environmental Engineering", Mc Graw Hill

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
ME 201	Engineering Mechanics	3	1	0	4

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	-	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Syllabus (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.

Text Books:

1. Meriam and Kraige, **"Engineering Mechanics-STATICS"**, John Wiley & Sons, Fifth Edition, 2010
2. Meriam and Kraige, **"Engineering Mechanics-DYNAMICS"**, John Wiley & Sons, Fifth Edition, 2010

Reference Books:

1. Engineering Mechanics, Basudeb Bhattacharyya, Oxford University Press
2. Vector Mechanics for Engineers, Beer and Johnston, Tata McGraw-Hill., Ninth Edition, 2009.
3. Engineering Mechanics, Hibbeler, Pearson Education, Sixth Edition, 2010
4. Engineering Mechanics, Andrew Pytel & Kiusalas, Cengage Learning, Third Edition, 2010.
5. Engineering Mechanics, Timoshenko and Young, Tata McGraw-Hill, Fourth Edition, 2006.
6. Engineering Mechanics- Statics and Dynamics, Shames, Pearson Education.
7. Engineering Mechanics, Boresi and Schmidt, CL-Engineering, First Edition, 2008.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
CSE201	Computer Programming	3	0	2	4

Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks **
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

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

Course Syllabi (Theory):

- 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.
- 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.
- 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.
- 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.
- Arrays in C, Pointers, Using pointers to represent arrays, Dynamic Memory allocation, structures, using typedef,
- Pointers: What is a Pointer? - How do you Define a Pointer? - Pointer Indexing - Pointer
- Arithmetic - Function data return with a Pointer - A pointer to a Function, Arrays of Structures & pointers,
- File Handling (Opening in different modes & closing of file, fscanf & fprintf only).

Course Syllabi (Practical):

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. Program using Structure and Union

Text Books:

1. Reema Thareja "*Computer Fundamentals and Programming in C*" Oxford Education, first.2012
2. Balagurusamy, "*Programming in ANSI C*" Tata Mcgraw Hill, sixth, 2012.

Reference Books:

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

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INSTITUTE OF ENGINEERING AND TECHNOLOGY

4 Year B. Tech Programme

(Branch: Electrical Engineering)

Batch 2014-18

SEMESTER-THREE

Detailed Syllabus

&

Scheme of Examination

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
EE301	Network Analysis & Synthesis	3	1	2	5

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

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

Syllabus (Theory)

UNIT-I

NETWORK CONCEPTS: 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.

NETWORK ANALYSIS TECHNIQUES AND THEOREMS: Superposition, Thevenin and Norton Theorem, Maximum power transfer Reciprocity theorem, Tellengen Theorem, Series and parallel resonant circuits and Q-factor, Mutual inductance ,Dot Convention and duality and concept of dual network, magnetically couples circuit analysis.

UNIT-II

GRAPH THEORY AND ITS APPLICATIONS: Fundamental concepts, definitions of a graph and various related terms, paths and circuit connections, trees of a graph, cut sets and tie sets, non-separable planner and dual graphs, matrices of oriented graphs, properties and inter relationships of incidence, tie and cut set matrices, complete circuit analysis using tie set and cutest matrices

UNIT-III

AC AND DC TRANSIENTS ANALYSIS: Laplace transform fundamentals, properties and theorems, unit step function, other unit function, the impulse, ramp and doublet, Laplace transform for shift and singular, functions, initial and final value theorems, 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, Time Constant, Complete response of RL, RC, and RLC circuits to step, sinusoidal, exponential, ramp, impulses and the combinations of excitations.

UNIT-IV

NETWORK FUNCTIONS: Concepts of Complex Frequency, Transform Impedance, Network functions of one and two port network, concepts of poles and zeros, properties of driving point and transfer functions, time response stability from pole zero plot.

TWO PORT NETWORK: Voltage & current ratio of two port network, Admittance, impedance, hybrid and transmission parameter of two port networks, Conversion of one parameter to another parameter, Series, parallel and cascade connection of two port networks, Condition of reciprocity & symmetry, Iterative and Image Impedance.

UNIT-V

NETWORK SYNTHESIS: Network reliability, Hurwitz Polynomials, Positive real functions, Properties of RC, RL & LC networks, Foster and Cauer forms of RC, RL & LC networks.

Syllabus (Practical)

1. Study and verification of Thevenin's Theorem.
2. Study and verification of Norton Theorem.
3. Study and verification of Superposition theorem.
4. Study and verification of Maximum power transfer Theorem.
5. Transient analysis of RL/RC circuits.
6. Transient analysis of RLC circuits.
7. Study of Two Port Network.
8. Study of Two Port Ladder Network.
9. Study and verification of T and π Networks.
10. Study of Inter Connection of Two Port Network

Text Book(s)

1. K.M.Soni, "Circuit & Systems" S.K.Kataria & Son, Eight Edition, 2008.
2. Van Valkenburg M.E., "Network Analysis", Prentice Hall, India, 3rd Edition, 2002.
3. A. Chakarbrati, "Circuit Theory", Dhanapat Rai and Co.

Reference Book(s)

1. T.K.Nagsarkar,M.S. Sukhija,"Basic Electrical Engineering", Oxford University press, 2nd edition, 2011.
2. Roy Choudhary, "Network Theory", TMH, 3rd Edition, 2004
3. Edminister Joseph A., "Electrical Circuits, Schaum's Outline Series", Tata McGraw Hill, 2nd edition, 1983.
4. Hayt W.H., Kemmerly J. E., Durbin S. M., "Engineering Circuit Analysis", Tata Mcgraw Hill, 6th edition, 2006

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
EE302	Electrical Machines-I	3	1	2	5

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

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

Syllabus (Theory)

UNIT-I

PRINCIPLES OF ELECTROMECHANICAL ENERGY CONVERSIONS: Introduction, Flow of Energy in Electromechanical devices, Energy in Magnetic Systems, Singly Excited System, Determination of Mechanical Force, Mechanical Energy, Torque Equation, Doubly Excited System, energy stored in magnetic field, Electromagnetic Torque, Generated EMF in Machines, Torque in Machines with Cylindrical air-gap.

UNIT-II

SINGLE PHASE TRANSFORMER: Types, Working principle, Construction, EMF equation, Phasor diagrams, Equivalent circuits, losses ,Efficiency and Voltage regulation, All Day Efficiency, O.C./S.C. Test, Sumpner Test, Polarity Test, Parallel Operation and load sharing.

AUTO TRANSFORMER: Single phase and Three Phase Auto-Transformer, VI relation, Regulation and Efficiency, advantages and disadvantages over two winding transformer, applications of auto transformer.

UNIT III

THREE PHASE TRANSFORMER: Construction, Phase Groups, Connections (including open delta),Parallel Operation and load sharing, magnetizing Inrush, harmonics in transformer, Three Winding Transformer.

UNIT IV

DC GENERATOR: Construction, Armature Winding, Equalizer connections, Dummy coils, EMF and Torque Equation, Armature reaction, Demagnetizing and Cross Magnetizing Effects, Commutation, Methods for Improving Commutation, Inter poles and Compensating winding, Performance Characteristics of dc generators, Parallel operation.

UNIT V

DC MOTOR: Performance characteristics of DC Motors, speed control of DC motors, Direct-Current Motors construction, Operation of a DC Motor, Starting of DC motor, 3 point and 4 point starters, Speed Regulation, Losses in a DC Motor, Series Motor, Shunt Motor, The Compound Motor, Methods of Speed Control, Efficiency and Testing of dc Machines -Brake Test, Swinburne Test, Hopkinson's Test, Field Test, Retardation Test.

Syllabus (Practical)

11. Speed control of D.C. shunt motor by (a) Field current control method & plot the curve for speed vs. field current. (b) Armature voltage control method & plot the curve for speed vs armature voltage.
12. Speed control of a D.C. Motor by Ward Leonard method and to plot the curve for speed vs applied armature voltage
13. To determine the efficiency of D.C. Shunt motor by loss summation (Swinburne's) method.
14. To determine the efficiency of two identical D.C. Machine by Hopkinson's regenerative test.
15. To perform O.C. and S.C. test on a 1-phase transformer and to determine the parameters of its equivalent circuit its voltage regulation and efficiency.
16. To perform back-to-back test on two identical 1-phase transformers and find their efficiency & parameters of the equivalent circuit.
17. To perform parallel operation of two 1-phase transformers and determine their load sharing.
18. To determine the efficiency and voltage regulation of a single-phase transformer by direct loading.
19. To study the performance of 3-phase transformer for its various connections, i.e. star/star star/delta delta/star and delta/delta and find the magnitude of 3rd harmonic current.
20. To perform parallel operation of two 3-phase transformers and determine their load sharing.

Text Book(s)

1. Nagrath I.J.and Kothari D.P, "Basic Electrical Engineering" TMH, Third Edition 2011.
2. B. L. Theraja, "A Text Book on Electrical Technology" S.Chand, Volumell. 2012.
3. Electric Machinery and Transformers-Bhag S. Guru,Huseyin R. Hiziroglu-Oxford Publication.
4. J B Gupta, "Theory and Performance of Electrical Machines"4th Edition, S.K.Kataria and Sons

Reference Book(s)

1. Electrical Engineering - Principles and Applications, Allan R. Hambley, PHI, fourth edition- 2007.
2. Electrical Machines by P S Bhimbra- Khanna Publishers.
3. Ashfaq Hussain, "Electrical Machines" 2nd Edition, Dhanpatrai and Sons

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
ECE 301	Electronic Devices & Circuits	3	1	2	5

Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

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

Syllabus (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.
- **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.
- **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.

Syllabus (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.

Text Books:

1. Microelectronics Circuits (Theory and Applications), Adel S. Sedra and Kenneth C. Smith, Adapted by Arun N. Chandorkar, 5th Ed. Oxford International Student Edition.
2. Electronic Device and Circuits, J.B. Gupta, Katson Educational Series.
3. Electronic Devices and Circuits, S. Salivahanan, N. Suresh Kumar and A Vallavaraj, Tata Mc-Graw Hill 2rd Edition

Reference Books:

1. Millman's Electronic Devices and Circuits, Jocob Millman, Christos C Halkias & Satyabrata Jit, Tata Mc-Graw Hill 3rd Edition.
2. Electronic Devices and Circuit Theory, Robert L. Boylestad and Louis Nashelsky, Pearson 10th Edition.
3. Electronic Devices and Circuits, David A. Bell, Oxford 5th Edition.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
ECE 303	Electromagnetic Field Theory	3	1	0	4

Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	-	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

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

Text Book:

1. 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.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MA 301	Engineering Mathematics – III	3	1	0	4

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks
20	20	40	10	10	100	-	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Course Syllabi (Theory):

Unit 1: Integral Transforms

Laplace transform and its properties, Fourier Transform.

Unit 2: Applications of Transform Calculus

Integral transform method for solving differential equations, Systems of Linear Differential Equations

Unit 3: Special Functions

Legendre and Bessel functions, series representations and recurrence relations

Unit 4: Calculus of variations

Extremal function, Euler Equation, Isoperimetric problems

Unit 5: 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

Text books and Reference books

8. Dennis G. Zill and Warren S. Wright, *Advanced Engineering Mathematics*, Fourth Edition (Student Edition), Jones & Barlett, Viba, New Delhi, 2011
9. Peter V. O'Neil, *Advanced Engineering Mathematics*, Seventh Indian Reprint, Cengage Learning, New Delhi, 2011.
10. Erwin Kreyszig, *Advanced Engineering Mathematics*, Wiley 9th Edition.
11. B. S. Grewal, *Higher Engineering Mathematics*, 41st Ed., Khanna Publishers, Delhi, 2011.
12. H. K. Dass, *Advanced Engineering Mathematics*, 12th editions with corrections, S. Chand and Company, Meerut, 2004
13. B. V. Ramana, *Higher Engineering Mathematics*, Tata Mcgraw Hill.
14. Potter M.C., Goldberg J.L., Edward F.A., *Advanced Engineering Mathematics*, 3rd Edition, Oxford University Press, 2005

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
HS 302	Principles of Management for Engineers	2	0	0	2

Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	-	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

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

Text Books:

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

Reference Books:

1. Koontz, Herold and Weihrich, Heinz. "Management". McGraw Hill, New York. 9th ed. 1988.
2. Stoner, James A. F. and Freeman, R Edward. "Management". Prentice Hall of India, New Delhi. 6th e, 1989.
3. Bateman, T. S. and Snell, S. A. "Management: Leading and Collaborating in a Competitive World", McGraw Hill Irwin. 8th edition,2009.
4. Draft, R. L. "Principles of Management". Cengage learning.2009
5. 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 2014-18

SEMESTER-FOUR

Detailed Syllabus

&

Scheme of Examination

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
EE401	Electrical Machine-II	3	1	2	5

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

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

Syllabus (Theory)

UNIT-I

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.

UNIT-II

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.

UNIT-III

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.

UNIT-IV

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

Syllabus (Practical)

1. To perform OC & SC test on a 3-phase transformer & find its efficiency and parameters for its equivalent circuit.

2. To perform no load and blocked rotor test on a three phase induction motor to determine the parameters of its equivalent circuits.
3. To plot OCC & SCC of an Alternator and to determine its regulation by synchronous impedance method.
4. To plot the V-curve for a synchronous motor for different values of loads.
5. To perform no load and blocked rotor test on a 3 phase induction motor and to determine the parameters of its equivalent circuits. Draw the circle diagram and compute the following (a) Max. Torque (b) Current (c) slip (d) p.f. (f) Efficiency.
6. To find Xd and Xq of a salient pole synchronous machine by slip test.
7. To perform the load test on a 3-phase induction motor and determine its performance
8. characteristics (a) Speed vs load curve (b) p.f. vs load curve (c) Efficiency vs load curve (d) Speed vs torque curve
9. To perform sumpner's back-to-back test on 3 phase transformers, find its efficiency &
10. parameters for its equivalent circuits.

Text Book(s)

1. Nagrath I.J.and Kothari D.P, "Basic Electrical Engineering" TMH, Third Edition 2011.
2. B. L. Theraja, "A Text Book on Electrical Technology" S.Chand, Volumell. 2012.
3. Ashfaq Hussain, "Electric Machines", Dhanpar Rai and Co.
4. Electric Machinery and Transformers-Bhag S. Guru,Huseyin R. Hiziroglu-Oxford Publication

Reference Book(s)

1. Electrical Engineering - Principles and Applications, Allan R. Hambley, PHI, fourth edition- 2007.
2. Electrical Machines by P S Bhimbra- Khanna Publishers.
3. J.B.Gupta, "Theory and Performance of Electrical Machines", S.K.Kataria and Sons.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
EE402	Transmission & Distribution of Electrical Power	3	1	0	4

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation	Total Marks
20	20	40	10	10	100	-	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Syllabus (Theory)

UNIT I

INTRODUCTION TO BASIC STRUCTURE OF POWER SYSTEM: Generation, Transmission and Distribution, generating stations, Schematic arrangement, advantages and disadvantages, efficiency, choice of site, types of prime movers, characteristic, speed control and auxiliaries. Environmental aspects for selecting sites and locations for; (a) Steam power station, (b) Hydro power station, (c) Nuclear power station (d) Gas turbine power plant, (e) Combined cycle power plant

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

UNIT II

OVERHEAD LINE INSULATORS: Different types, Insulator failure, voltage distribution in insulator string and grading, improvement of string efficiency.

MECHANICAL DESIGN OF OVERHEAD LINES: Sag and tension calculations, Effect of ice and wind, Stringing chart, Sag template, Tower design, Spacing and clearance, Vibration damper

OVERHEAD TRANSMISSION LINE: Types of conductors, Calculation of line parameters – Inductance and Capacitance of single phase, three phase, symmetrical and unsymmetrical configurations, Concepts of GMD and GMR, Transposition, Bundle conductors, Double or parallel circuit, Effect of earth on capacitance calculation, Interference with communication circuit, Concept of Corona discharge.

UNIT III

POWER FLOW THROUGH TRANSMISSION LINE: Mathematical expressions, Effect of active and reactive power flow on bus voltage magnitude and phase angle.

PERFORMANCE OF LINES: Short, medium and long lines - Representation, A, B, C, D constants, Voltage regulation and Transmission efficiency, Ferranti effect.

UNIT IV

UNDERGROUND CABLES: Different types, Insulating materials, Dielectric stress, Grading, Capacitance, Heating and causes of breakdown.

POWER SYSTEM GROUNDING OR EARTHING: Equipment grounding, Neutral grounding – Different methods, Grounding transformer. Introduction to EHVAC and HVDC transmission and comparison between them.

Text Book(s)

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. Sivanagaraju and Satyanarayana, "Electrical Power Transmission and Distribution", Pearson Education.

Reference Book(s)

1. William H.Kersting, "Distribution system modeling and analysis", CRC press publication .
2. J.B.Gupta "Transmission & Distribution of Electrical Power", S.K.Kataria & Sons publication.
3. Soni, Gupta, Bhatnagar "Electrical Power System."Dhanpat Rai & Sons.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
EE 403	Conventional Energy Sources	3	0	0	3

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks
20	20	40	10	10	100	-	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Syllabus (Theory)

UNIT I

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.

UNIT II

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.

UNIT III

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.

UNIT IV

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.

UNIT V

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.

Text Book(s)

1. Power System Engineering – I.J.Nagrath & D.P.Kothari
2. Generation of Electrical Energy –B.R. Gupta
3. Non-Conventional Energy Sources-G.D.Rai-Khanna Publication

Reference Book(s)

1. Electrical Energy System Theory – O.I.Elgerd
2. Towards Clean Energy – B.Ghosh, Saha B., S.K.Basu, Sujay
3. Elements of power station design – M.V.Deshpande
4. Economic Load Dispatching - L. R. Kirchmare

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
ECE 402	Digital Electronics	3	1	2	5

Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

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

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 3bit synchronous up/down counter.
11. Implementation of SISO, SIPO, PISO and PIPO shift registers using flip-flops

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.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
ECE 406	Measurements & Instrumentation	3	0	2	4

Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

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

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):

1. To study Anderson Bridge
2. To Study Wien Bridge Oscillator trainer
3. To study Maxwell's Capacitance & Inductance Bridge
4. To study Solar Energy Trainer with built in Voltmeter & Ammeter.
5. To study Ultrasonic transducer Trainer
6. Displacement measurement using LVDT
7. Temperature measurement using RTD, Thermistors, Thermocouple, Thermometers, Calibration.
8. To study Bench top LCR meter
9. Force measurement using Strain Gauges and Load Cells

10. Measurement of earth resistance by fall of potential method

11. To study the working of Spectrum analyzer and determine the bandwidth of different signals.

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

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MA 402	Numerical and Statistical Methods	3	0	2	4

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

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

Syllabus (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: Bisection Method, *Regula-falsi* Method, Secant Method, Newton Raphson Method
- **Linear Algebraic Equations:** LU Decomposition Method, Gauss Elimination Method, Gauss Jordan Elimination Method, Iterative methods for solving system of linear equations.
- **Interpolation and approximation:** Netwon Formula for forward and backward interpolation, Sterling Central difference interpolation, Lagrangian Interpolation
- **Numerical Differentiation and Integration:** Numerical Differentiation and Integration, Newton-Cotes Integration Formulae.
- **Ordinary Differential Equations:** Picard Method, Euler Method, Modified Euler Method, Runge-Kutta 4^{th} order Method, Milne Predictor-Corrector Method
- **Random Variables and probability distributions:** Introduction to probability, Discrete and continuous random variables, Probability Distributions: Binomial, Possion, Exponential, Normal distributions, 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 Tests, Chi-square goodness of fit test, Contingency tables.
- **Correlation and regression:** Types of Relationships, Scatter Diagrams, Regression Line, Coefficients of Determination and Correlation

Syllabus (Practical)

Numerical Methods using MATLAB and Statistical Analysis using SPSS in Computer Labs that includes:

1. Numerical solution of algebraic and transcendental equations.
2. Numerical solution of system of linear equations.
3. Interpolation.
4. Numerical differentiation.

5. Numerical integration.
6. Numerical solution of differential equations.
7. Data Analysis using Correlation and Regression
8. Test of Hypothesis

Text books 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, *Applied Numerical Methods with MATLAB for Engineers and Scientists*, 3rd Editions, Tata Mc Graw Hill, New Delhi, 2012.
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.

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INSTITUTE OF ENGINEERING AND TECHNOLOGY

4 Year B. Tech Programme

(Branch: Electrical Engineering)

Batch 2014-18

SEMESTER-FIVE

Detailed Syllabus

&

Scheme of Examination

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
EE 501	Linear Control Systems	3	1	2	5

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

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

Syllabus (Theory)

UNIT I

INTRODUCTION TO CONTROL SYSTEM: Open loop and closed loop systems, examples, components of control systems, types of control systems, concept of feedback, positive and negative feedback.

MATHEMATICAL MODELING OF PHYSICAL SYSTEMS: Modeling of physical systems such as mechanical, electrical, thermal and chemical systems, analogous systems, concept of transfer function, poles, zeros, order and type of the system, computation of overall transfer function, block diagram reduction techniques, signal flow graphs.

UNIT II

TIME RESPONSE ANALYSIS: Standard test signals, transient and steady state response of first and second order systems, 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.

UNIT III

STABILITY ANALYSIS OF CONTROL SYSTEMS: Notations of stability, Necessary conditions for stability, Routh-Hurwitz stability criterion, Relative stability, Basic properties of root locus, rules to construct root locus, stability analysis using root locus.

UNIT IV

FREQUENCY DOMAIN ANALYSIS: Introduction to frequency response, frequency domain specifications, stability analysis using Bode plots, stability analysis using Polar and Nyquist plots.

UNIT V

INTRODUCTION TO STATE SPACE: Concept of state, state variables, state space modeling, conversion of state space equations to transfer function, solution of state equation, controllability and observability.

DESIGN AND COMPENSATION: Design consideration of control system, lead, lag, lead-lag compensation, Design of compensating network using bode plots and root locus.

Syllabus (Practical)

1. Introduction to MATLAB Computing Control Software.
2. For a given 2^{nd} order system plot step response and obtain time response specification.
3. 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 w_n natural undamped frequency (b) Plot ramp response.
4. To design 1st order R-C circuits and observes its response with the following inputs and traces the curve.
   - Step
   - Ramp
   - Impulse
5. To design 2^{nd} order electrical network and study its trarient response for step input and following cases.
   - Under damped system
   - Over damped System.
   - Critically damped system
6. To Study the frequency response of following compensating Networks, plot the graph and final out corner frequencies.
   Log Network
   Lead Network
   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..

Text Book(s)

1. I J Nagrath and M Gopal: Control Systems Engineering, 3rd Ed, New Age Publication.
2. B C Kuo: Modern Control Engineering, , New Age Publication
3. Katsuhiko Ogata, "Modern Control Engineering", PHI Learning Pvt. Ltd., New Delhi

Reference Book(s)

1. Robert H Bishop : Modern Control Systems, Boyd and Fraser pub
2. Norman S.Nise, "Control System Engineering", John Wiley & Sons.
3. Gene F. Frankline, J. David Powell, Abbas Emami-Naeini, "Feedback Control of Dynamic Systems", Pearson Education Inc., 2006

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
EE502	Power System Switchgear & Protection	3	1	2	5

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

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

Syllabus (Theory)

UNIT I

INTRODUCTION AND PHILOSOPHY OF A PROTECTIVE RELAYING SYSTEM: Types of Faults – Abnormalities – Functions of Protective Relay Schemes – major Components of Power system – Basic Tripping Circuit – Testing and Maintenance of Relays – Zones of Protection – Requirements of Protective Systems – Relay Operating Criteria – Main and Backup Protection ,HRC Fuse.

UNIT II

PROTECTIVE CURRENT and POTENTIAL TRANSFORMER: CT Equivalent Circuit, Vector diagram, Construction, magnetization Curve, Core, Errors, accuracy, Specifications, Factors affecting selection PT: Equivalent circuit, Construction, CVT, Specifications.

DIFFERENT TYPES OF RELAYS:

Electromagnetic 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.

Static Relays: Advantages and Limitations, basic Elements, Static Relays Architecture.

UNIT III

THEORY OF CIRCUIT INTERRUPTION: Introduction, Physics of arc phenomena, Maintenance of the arc, Losses from plasma, Essential properties of arc, Arc interruption theories.

CIRCUIT CONSTANTS IN RELATION TO CIRCUIT BREAKING: Introduction, Circuit breaker rating,Circuit constants and circuit conditions Re-striking voltage transient Characteristics of re-striking voltage, Interaction between the breaker and circuit, Current chopping, The duties of switchgear.

THEORY AND PRACTICE OF CONVENTIONAL CIRCUIT BREAKERS: Automatic switch, Air-break circuit breakers, Oil circuit breakers, Single and multi break construction, Air-blast circuit breaker, Performance of circuit breakers and system requirements, Modification of circuit breaker duty by shunt resistors, Power factor correction by series resistance, Comparative merits of different types of conventional circuit breakers.

RECENT DEVELOPMENTS IN CIRCUIT BREAKERS: Modern trends, Vacuum circuit breakers, Sulphur hexafluoride (SF6) circuit breakers DC circuit breaker.

UNIT IV

GENERATOR PROTECTION : Differential Protection , Inter-turn fault Protection, stator E/F, Rotor E/F, NPS, Field Failure, Over Load, Over Voltage, Reverse Power, Pole-Slipping, Back-up Impedance, Under Frequency , Miscellaneous Protection.

TRANSFORMER PROTECTION: Faults in Transformer – Gas operated relays – Over Current Protection – REF Protection – Differential Protection – Protection against over fluxing – Protection of Grounding transformers – Protection Against Overheating - Protection for small transformers.

UNIT V

PROTECTION OF TRANSMISSION LINES: Protection of Lines by Over Current Relays-Protection of Lines by Distance Relays-Carrier Current Protection for lines.

BUS ZONE PROTECTION: Protection Requirements-Non unit protection-Unit protection schemes.

MICROPROCESSOR BASED DIGITAL PROTECTION: Advantages of Numerical Relays – Numerical Relay Hardware - Digital Signal Processing – estimation of Phasors – Full Cycle Fourier Algorithm – Half Cycle Fourier Algorithm – Practical Consideration for Selection of Algorithm – DFT- FFT.

Syllabus (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. Checking characteristic and operation of Inverse Time Over Current relays having following characteristic

   Electromechanical relays.

   A. Extremely Inverse relay (EI)

   B. Very Inverse Relay (VI)

   C. Normal Inverse Relay (NI)
4. Checking characteristic and operation of percentage bias differential and 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
9. Understanding SCADA System for the above Protection Systems setups having IEC 61850 open protocol.

Text Book(s)

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. Sunil S. Rao – "Switchgear and Protection" Khanna Publications New Delhi
4. Y. G. Parithankar and S. R. Bhide, "Fundamentals Of Power System Protection" 2nd edition, PHI.

Reference Book(s)

1. J.B.Gupta "Transmission & Distribution of Electrical Power", S.K.Kataria & Sons publication.

2. B. Ravindranath And M. Chander, "Power System Protection And Switchgear"
3. Patra and Basu, "Power System Protection"

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
EE503	MODELING AND SIMULATION	3	0	2	4

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

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

Syllabus (Theory)

UNIT I

SYSTEMS AND MODELS: Introduction to system, classification of systems, Models and Simulation, different types of mathematical models, Building and verifying models.

PHYSICAL MODELING: General Principles of modeling, Examples of dynamic mathematical models, circuits as dynamic systems, distinguished role of differential equations in developing mechanistic models, setting up ODE models, Numerical solution of ODEs.

UNIT II

ANALYSIS OF MODELS: Laplace Transform, circuit analysis with Laplace Transform, Circuit transformation from time to complex frequency, complex impedance, complex admittance, transfer functions, concept of pole and zero, stability, transient analysis , minimum phase and non-minimum phase system, Use of simulation software for electrical system analysis.

UNIT III

CONCEPT OF STATE AND STATE-SPACE BASED MODELING: Linearization of first principle model,Concept of state, state variables, state-space form, state diagram representation, non-uniqueness of state-space model, derivation of state model from different representation of a system, canonical state space models, Examples of state-space modeling of different electrical systems, observability and controllability, derivation of transfer function from state-space and vice versa, state transition matrix, solution of state-space equations, computation of state transition matrix.

UNIT IV

DISCRETE SYSTEM ANALYSIS USING Z-TRANSFORM: Introduction to Discrete systems, sampling, conversion of continuous to discrete state Space models, Introduction to Z-transform, properties of Ztransform.

DATA BASED MODELING TECHNIQUES: Stochastic and statistical properties of the process, different types of regression models, parametric modeling using least square technique, Using system identification as a tool for model building, design of identification experiments, post treatment of data, choice of model structure, Model validation using cross validation concept.

Syllabus (Practical)

1. Introduction to mathematical computational and simulation software.
2. To study linearization of non-linear systems.
3. Solving ODEs using computational software (Development of Process Simulator).
4. Mathematical model development and simulation of DC Motor using computational software.
5. Introduction to graphical programming.
6. Modeling and simulating, the generation, transmission, distribution, and consumption of electrical power.
7. Experiment based on data based modeling techniques.
8. Mathematical modeling of unstable systems using closed loop identification techniques.
9. Transient analysis of simple RC, RL and RLC circuits.
10. Introduction to for PSpice , PSCAD and LABVIEW as a tool for modeling and simulation.

Text Book(s)

1. Lennart Ljung, Torkel Glad, "Modeling of Dynamic System", Prentice Hall, Englewood Cliffs, NJ,1994
2. Robert L. Woods and Kent L. Lawrence, "Modeling and Simulation of Dynamic Systems", 1st Edition, Prentice Hall, 1997.
3. SR Otto, "An Introduction to Programming and Numerical Methods in MATLAB", Springer, 2011.
4. Charles M. Close, Dean K. Frederick, Jonathan C. Newell, "Modeling and Analysis of Dynamic Systems", 3rd Edition, John Wiley and Sons Inc., 2002
5. Steven T.Karris, "Circuit Analysis II with MATLAB Computing and Simulink/SimPower Systems Modeling", Orchard Publications, Fremont, California, 2009

Reference Book(s)

1. Kai Velten, "Mathematical Modeling and Simulation-Introduction for Scientists and Engineers", Wiley-VCH Verlag GmbH and Co. KGaA, 2009.
2. P. P. J. van den Bosch, A. C. van der Klauw, "Modeling, Identification and Simulation of Dynamical Systems", CRC Press, 1994.
3. John Penny, George Lindfield, "Numerical Methods using MATLAB", PHI, Upper Saddle River, NJ 2000.
4. Frankline, J. Powelll, Abbas Emami-Naeini, "Feedback Control of Dynamic Systems", 5th Edition, Pearson Education, 2006.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
ECE501	Linear Integrated Circuits	3	0	2	4

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test – I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

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

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. To study Op-Amp 741 characteristics and its various parameters from data sheet.
2. To study Op-amp based inverting and non-inverting amplifiers, voltage comparator and zero crossing detectors.
3. To study Op-Amp as scalar, summer and voltage follower.
4. To study Op-Amp as differentiator and integrator.
5. To design 1st order low pass and high pass active filters using Op-Amp 741.

6. To design Band Pass and Band reject Active filters using Op-Amp 741.
7. To design Oscillators using Op-Amp (i) RC phase shift (ii) Wien bridge at 1 kHz.
8. To design (i) Astable (ii) Monostable Multivibrators using IC-555 timer
9. To design Triangular & square wave generator using 555 timer.
10. To study operation of IC NE/SE 566 Voltage Controlled Oscillator and determine output frequency for various voltage levels.
11. To study Op-Amp based V to I and I to V converters.
12. To study a PLL circuit and determine the free running frequency.
13. To study Op-Amp based sample and hold circuit.
14. To design Schmitt trigger using op-amp.

Text Books:

1. Op-Amps and Linear Integrated Circuits, Ramakant A. Gayakwad, PHI Learning, 4th Edition.
2. Op-amp & Linear ICs, David A. Bell, Prentice Hall of India, 2nd Edition, 1997.

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.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
ECE505	Engineering Signals & Systems	3	1	0	4

Evaluation Scheme (Theory)					
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks
20	20	40	10	10	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

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 and the region of convergence of the Z-transform. The Inverse 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..

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

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
EE521 (Elective-I)	ELECTRICAL AND ELECTRONIC ENGINEERING MATERIALS	3	0	0	3

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks
20	20	40	10	10	100	-	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Syllabus (Theory)

UNIT I

METAL AND INSULATORS: Electron theory of metals, factor affecting electrical resistance of materials, Matthiessen's rule, mixture, Skin effect: HF resistance of a conductor, thin metal films and integrated circuits interconnections, thermal conductivity of metals, heat developed in current carrying conductors, thermoelectric effects, dielectrics, polarization and relative permittivity, polarization mechanisms, frequency dependent dielectric constant and dielectric loss, dielectric strength and insulation breakdown, partial discharge, capacitor dielectric materials, ultra-capacitors, properties and applications of electrical conducting and insulating materials, composite conductors, aluminum conductor steel reinforced (ACSR), Aluminum Conductor Composite Reinforced (ACCR).

UNIT II

SEMICONDUCTOR MATERIALS: Introduction to quantum mechanics, number of states, density of energy states in conduction and valance band of semiconductor, types of semiconductors, current carriers in semiconductors, Hall effect, drift and diffusion currents, continuity equations, P-N junction diode, built in potential barrier, electric field, space charge width, junction capacitance, one sided junctions, generation and recombination currents, junction transistor, introduction to silicon carbide, properties of semiconducting materials.

UNIT III

SEMICONDUCTOR OPTICAL DEVICES: Optical absorption, photon absorption coefficient, electron-hole pair generation rate, Solar cells; PN junction solar cells, conversion efficiency and solar concentration, non uniform bsorption effects, Light emitting diodes; generation of light, internal quantum efficiency and external quantum efficiency, LED Devices, semiconductor laser diodes.

UNIT IV

MAGNETIC PROPERTIES OF MATERIALS: Origin of permanent magnetic dipoles in matters, classification diamagnetism, Para-magnetism, ferromagnetism, anti-ferromagnetism and ferrimagnetisms, magnetostriction, properties of magnetic materials, CRGO, μ-metal, soft and hard magnetic materials, permanent magnetic materials, super conductivity and superconducting materials.

Text Book(s)

1. R.K. rajput, "Electrical Engineering Materials", Laxmi Publications
2. T.K. Basak, "Electrical Engineering materials", New Age International
3. Donald. A. Neamen, "Semiconductor physics and devices", Tata McGraw Hill publications

Reference Book(s)

1. S.O. Kasap, "Principles of electronic materials and devices", Tata McGraw Hill publications
2. A.J. Dekker, "Electrical Engineering Materials", Prentice Hall of India
3. Ian p. Hones, "Material Science for electrical and electronic engineering", Oxford University Press.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
EE522 (Elective-I)	Advanced Distribution System	3	0	0	3

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks
20	20	40	10	10	100	-	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Syllabus (Theory)

UNIT I

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.

UNIT II

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

UNIT III

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.

UNIT IV

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.

UNIT V

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.

Text Book(s)

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)

Reference Book(s)

1. J. J. Grainger& W. D. Stevenson: Power System Analysis (TMH).
2. Kamaraju: Electrical Power Distribution Systems (TMH)

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
CSE521 (Elective-I)	Management Information System	3	0	0	3

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100					

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Course Syllabi (Theory):

- Organization & Types, Decision Making, Data & information, Characteristics & Classification of information, Cost & value of information, Various channels of information & MIS. Foundation of Information System: Introduction to Information System in Business Fundamentals of Information System, Solving Business Problems with Information System, Concept of Balanced MIS, Effectiveness & Efficiency Criteria. Tool and Techniques of MIS- dataflow diagram, flow chart etc.
- Business application of information technology, electronic commerce, Internet, Intranet, Extranet & Enterprise Solutions, Information System for Business Operations, Information system for managerial Decision Support, Information System for Strategic Advantage. Managing Information Technology, Enterprise & Global Management, Security & Ethical Challenges, Planning & Implementing Change.
- Reports: Various types of MIS reports, GUI & Other Presentation tools.
- Advanced concepts in information system: Enterprise Resource Planning: introduction, various modules like Human Resources, Finance, Accounting, Production & Logistics. Supply Chain Management, CRM, Procurement Management System Object Oriented modeling case studies.

Text & Reference Books

1. O.Brian, "Introduction to Information System", Mc-Graw Hill.
2. O.Brian, "Management Information System", TMH.
3. Alter, "Information Systems : A Management Perspective", Addison Wesley.
4. Arora & Bhatia, "Information Systems for Managers", Excel
5. Bansal, "Information System Analysis & Design", TMH.
6. Jawadegar, "Management Information System", TMH.
7. Murdick, "Information System for Modern Management", PHI.
8. Alexis Leon, "Enterprise Resource Planning", TMH.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
PS501	Practice School – I				4

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

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.

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INSTITUTE OF ENGINEERING AND TECHNOLOGY

4 Year B. Tech Programme

(Branch: Electrical Engineering)

Batch 2014-18

SEMESTER-SIX

Detailed Syllabus

&

Scheme of Examination

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
EE 604	Non-Conventional Energy Sources	3	1	0	4

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks
20	20	40	10	10	100	-	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Syllabus (Theory)

UNIT I

INTRODUCTION: Various non-conventional energy resources- Introduction, availability, classification, relative merits and demerits.

SOLAR CELLS: Theory of solar cells, solar cell materials, solar cell array, solar cell power plant, limitations.

UNIT-II

SOLAR THERMAL ENERGY: Solar radiation, flat plate collectors and their materials, applications and performance, focusing of collectors and their materials, applications and performance; solar thermal power plants, thermal energy storage for solar heating and cooling, limitations.

UNIT-III

Geothermal Energy: Resources of geothermal energy, thermodynamics of geo-thermal energy conversion-electrical conversion, non-electrical conversion, environmental considerations.

Magneto-hydrodynamics (MHD): Principle of working of MHD Power plant, performance and limitations.

Fuel Cells: Principle of working of various types of fuel cells and their working, performance and limitations.

UNIT-IV

THERMO-ELECTRICAL AND THERMIONIC CONVERSIONS: Principle of working, performance and limitations.

WIND ENERGY: Wind power and its sources, site selection, criterion, momentum theory, classification of rotors, concentrations and augments, wind characteristics, Performance and limitations of energy conversion systems

UNIT-V

BIO-MASS: Availability of bio-mass and its conversion theory.

OCEAN THERMAL ENERGY CONVERSION (OTEC): Availability, theory and working principle, performance and limitations.

WAVE AND TIDAL WAVE: Principle of working, performance and limitations. Waste Recycling Plants

Text/References Books:

1. Raja etal, "Introduction to Non-Conventional Energy Resources" Scitech Publications.

2. John Twideu and Tony Weir, "Renewal Energy Resources" BSP Publications, 2006.

3. M.V.R. Koteswara Rao, " Energy Resources: Conventional & Non-Conventional " BSP Publications,2006.

4. D.S. Chauhan,"Non-conventional Energy Resources" New Age International.

5. C.S. Solanki, "Renewal Energy Technologies: A Practical Guide for Beginners" PHI Learning

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
EE5602	Power System Analysis	3	1	2	5

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

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

Syllabus (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.

Syllabus (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

Text Book(s)

1. C.L.Wadhwa,"Electrical Power System", New age international publisher.
2. Power system engineering -Nagarath & Kothari
3. Power System Stability & Control -P.Kundur

Reference Book(s)

1. Electric Power System -B.M.Weedy

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
EE603	Industrial Electronics	3	1	2	5

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

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

Syllabus (Theory)

UNIT I

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.

UNIT II

PHASE CONTROLLED CONVERTERS: Single phase uncontrolled, half-controlled and fully controlled converters. Three-phase half-controlled and full controlled bridge converters.

UNIT III

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

UNIT I

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.

Syllabus (Practical)

1. Determine V-I characteristics of SCR and measure forward breakdown voltage, latching and holding currents.
2. Find V-I characteristics of TRIAC and DIAC
3. Find transfer and output characteristics of MOSFET and IGBT

4. Find output characteristics of MOSFET and IGBT
5. Study and test firing circuits for SCR-R, RC and UJT firing circuits.
6. Study and test 3-phase diode bridge rectifier with R and RL loads. Study the effect of filters
7. Study and obtain waveforms of single-phase half wave controlled rectifier with and without filters. Study the variation of output voltage with respect to firing angle
8. Study and obtain waveforms of single-phase half controlled bridge rectifier with R and RLloads. Study and show the effect of freewheeling diode.
9. Study and obtain waveforms of single-phase full controlled bridge converter with R and RLloads.
10. Study Control the speed of a dc motor using single-phase half controlled bridge rectifier and full controlled bridge rectifier. Plot armature voltage versus speed characteristics

Text Book(s)

1. Bimbhra.P.S. "Power Electronics" Khanna Publisher.
2. Singh .M.D. & Khanchandani K.B. "Power Electronics" Tata McGraw Hill
3. Sen. P.C. "Power Electronics", Tata McGraw Hill

Reference Book(s)

1. M. Ramamurthy: An Introduction to Thyristors and their Applications, East West Press Pvt Ltd.
2. Mohammad H. Rashid : Power Electronics Circuits, Devices and Applications, Prentice Hall of India Pvt Ltd.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
ECE603	Digital Signal Processing	3	1	2	5

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

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

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.

Course Syllabi (Practical):

1. Generation of continuous and discrete elementary signals (periodic and non-periodic) using mathematical expression.
2. Generation of Exponential and Ramp signals in Continuous & Discrete domain.
3. Continuous and discrete time Convolution
4. Adding and subtracting two given signals. (Continuous as well as Discrete signals)
5. Circular Convolution
6. To generate random sequences with arbitrary distributions, means and variances for following :
    - Rayleigh distribution
    - Normal distributions: N(0,1)
    - Gaussion distributions: N (m_x, σ_x^2)
7. Power Spectral Density of a sinusoidal signals
8. MATLAB program to generate sum of sinusoidal signals
9. MATLAB program to find frequency response of analog(LP/HP)

10. To design and simulate FIR digital filter (LP/HP).
11. To design and simulate IIR digital filter (LP/HP).

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.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
ECE604	Microprocessors & Interfacing	3	0	2	4

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

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

Course Syllabi (Theory):

- Revision of logic circuits with emphasis on control lines, SAP concepts with stress on timing diagrams, Microinstructions, Microprogramming, Variable machine cycle, Architecture of 8085 Processor , Functions of all signals, Bus concepts, Multiplexed and De-multiplexed Bus, Minimum system.
- Instruction set, Addressing modes, Stack operation, Timing diagrams, Programming examples like Time delay, Looping, Sorting, Code conversions like BCD to Binary, Binary to BCD, HEX to ASCII, ASCII to HEX, BCD Arithmetic etc.
- 8085 based Microcomputer system, Memory Organization, Memory Interfacing, Memory Mapped I/O, I/O Mapped I/O, Interrupts, Hardware and Software Interrupts, Interrupt instructions, Programmed I/O, Interrupt driven I/O, DMA.
- Architecture of 8255 I/O peripheral chip, Modes of operation, Hand shake mode operation, BSR mode, ADC 0801 and ADC 0808 Interfacing with microprocessor, Analogue multiplexed ADC, DAC 0808 specifications, DAC Interfacing.
- 8253 timer, Modes of operation, Applications, 8279 Keyboard/Display Interface, Different modes of operation, Interfacing, Programming examples, 8237 DMA Controller.
- Introduction to Microcontrollers, 8051 Microcontroller, Memory Organization, Programming techniques, Addressing modes, Instruction set, Interrupt structure, Port structure, Different modes of operation, Programming examples.

Course Syllabi (Practical):

1. Familiarization with 8085 register level architecture and trainer kit components, including the memory map. Familiarizationwiththeprocessofstoringandviewingthecontentsofmemoryaswellas registers.
2. Study of prewritten programs on trainer kit using the basic instruction set (data transfer, Load/Store, Arithmetic, Logical)
3. Transfer of a block of data in memory to another place in memory in the direct and reverse order.
4. Searching a number in an array and finding its parity.
5. Serial and Parallel data transfer on output port 8155 & 8255 & designing of disco light, running light, and sequential lights on off by above hardware.
6. Generation of different waveform on 8253/ 8254 programmable timer.
7. Program using subroutine calls and IN/OUT instructions using 8255 PPI on the trainer kit eg, subroutine for delay, reading switch state & glowing LEDs accordingly, finding out the frequency of a pulse train etc
8. Interfacing any 8 bit Latch (eg,74LS373) with trainer kit as a peripheral mapped output port with absolute address decoding.

Text Books:

1. Ramesh S. Gaonkar, "Microprocessor Architecture, programming and applications with the 8085", Penram International
2. Muhammad Ali Mazidi, "The 8051 Microcontroller and embedded systems, Pearson Ed.
3. S. K. Venkata Ram, "Advanced Microprocessors and Microcontrollers", McGraw Hill.

Reference Books:

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

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
EE622 (Elective-II)	Restructured Power Systems	3	0	0	3

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks
20	20	40	10	10	100	-	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Syllabus (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

Text Book(s)

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

Reference Book(s)

1. Market operations in electric power systems - M. Shahidehpour, H. Yamin and Z. Li
2. Fundamentals of power system economics - S. Kirschen and G. Strbac
3. Optimization principles: Practical Applications to the Operation and Markets of the Electric Power Industry - N. S. Rau.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
EE621(Elective-II)	Power System Transients	3	0	0	3

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks
20	20	40	10	10	100	-	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Syllabus (Theory)

UNIT I

SWITCHING TRANSIENTS: Wave terminology, Development of wave quotations, Terminal problems, Lattice diagrams, Origin and Nature of power system transients and surges, Surge parameters of plants, Equivalent Circuit representations. Lumped and distributed circuit transients.

UNIT II

LOAD SWITCHING: Line denergisation and de-energisation transients-Earth and earthwire effects. Current chopping in circuit breakers. Short line fault condition and its relation to circuit breaker duty. Trapped charge effects. Effect of source and source representation in short line fault studies.

UNIT III

LIGHTNING TRANSIENTS AND TRAVELLING WAVES: Lightening phenomenon ,Mechanism of Lightning Discharge Types of Lightning strokes, Harmful effects of lighting, protections against lightning, overhead Ground wires, influence of tower footing resistance and earth resistance, Traveling waves in distributed parameters multiconductor lines, parameters as a function of frequency.

UNIT IV

LIGHTENING ARRESTERS: Types of lightening arresters, Surge absorber, surge diverters, Fourier integral and z transform methods in power system transient.

Text Book(s)

1. M.S.Naidu and V.Kamraju – High Voltage Engineering, Tata McGraw Hill Publishing,Company, New Delhi
2. C.L.Wadhwa,"Electrical Power System", New age international publisher.
3. V.K.Mehta, Rohit Mehta" Principles of Power System", S.Chand Publications
4. Sunil S. Rao – "Switchgear and Protection" Khanna Publications New Delhi

Reference Book(s)

1. B. Ram, D.N. Vishwakarma- Power system protection and switchgear-TMH
2. Juan A. Martinez-Velasco,"Power System Transients: Parameter Determination", CRC Press,2009
3. Rokosh Das Begamudre- EHV AC. Transmission Engineering, Wiley Easter Ltd. New Delhi.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MA 621 (Elective-II)	Engineering Optimization	3	0	0	3

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks
20	20	40	10	10	100	-	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Syllabus (Theory)

- **Introduction:** Introduction to Optimization and its scope, Formulating a Mathematical Model, Deriving Solutions from the Model
- **Linear Programming Problems:** Revised Simplex Method, Duality Theory and Sensitivity Analysis, Dual Simplex Method, Transportation Problem, 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
- **Other Optimization Models:** Dynamic Programming, Integer Programming, Game Theory
- **Multi-objective optimization**: Introduction to various multi-objective optimization techniques and its scope, Linear Goal Programming and Its Solution

Text books and 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.

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INSTITUTE OF ENGINEERING AND TECHNOLOGY

4 Year B. Tech Programme

(Branch: Electrical Engineering)

Batch 2014-18

SEMESTER-SEVEN

Detailed Syllabus

&

Scheme of Examination

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
EE 701	Electric Drives and Control	3	1	0	4

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks
20	20	40	10	10	100	-	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Syllabus (Theory)

UNIT I

INTRODUCTION: - Definition & classification of different type of drives, Review of characteristics and components of electric drives, Speed control methods of various a.c. and d.c. drives, its advantages and applications, acceleration and retardation time, energy consideration.

UNIT II

BRAKING OF DRIVES:- Various methods of braking of a.c. and d.c drives, Automatic control arrangement, characteristics and application, acceleration and Retardation time ,Energy consideration.

UNIT III

INDUCTION MOTOR (A.C) DRIVES:- Basic principle of induction motor drives, 3 Ø a.c voltage controller fed I.M drive, variable frequency control, voltage source inverter (VSI) and current source inverter (CSI), cycloconverter fed IM drive, Slip Power control, static rotor resistance control, chopper control of 3 -Ø slip ring induction motor.

UNIT IV

DRIVES: - Rectifier controlled circuits, Single phase fully controlled and half controlled rectifier fed separately excited d.c motor, 3Ø fully and half controlled fed separately excited d.c. Motor, performance and characteristics of single phase and 3Ø rectifier controlled d.c drives. Control techniques of d.c. Drives using chopper, multi quadrant control of chopper fed motors.

UNIT V

DYNAMICS OF ELECTRIC DRIVES:- Fundamental load torque equation, permissible frequency of starting and stopping, definite time, speed and current limit control, Automatic starting and pulling operation of synch.

Text Book(s)

1. G.K.Dubey," Fundamentals of Electric Drive". Narosa Publishing House.
   Bimbhra.P.S. "Power Electronics" Khanna Publisher.
2. Singh .M.D. & Khanchandani K.B. "Power Electronics" Tata McGraw Hill
3. Sen. P.C. "Power Electronics", Tata McGraw Hill

Reference Book(s)

1. M. Ramamurthy: An Introduction to Thyristors and their Applications, East West Press Pvt Ltd.
2. Mohammad H. Rashid : Power Electronics Circuits, Devices and Applications, Prentice Hall of India Pvt Ltd.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
EE 702	High Voltage Engineering	3	1	0	4

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks
20	20	40	10	10	100	-	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Syllabus (Theory)

UNIT I

BREAK DOWN IN GASES: Ionization processes, Townsend's criterion, breakdown in electro negative gases, time lags for breakdown, streamer theory, Paschen's law, breakdown in non-uniform field, breakdown in vacuum.

BREAKDOWN IN LIQUID DIELECTRICS: Classification of liquid dielectric, characteristic of liquid dielectric, breakdown in pure liquid and commercial liquid.

BREAKDOWN IN SOLID DIELECTRICS: Intrinsic breakdown, electromechanical breakdown, breakdown of solid, dielectric in practice, breakdown in composite dielectrics.

UNIT II

GENERATION OF HIGH VOLTAGES AND CURRENTS: Generation of high direct current voltages, generation of high alternating voltages, generation of impulse voltages, generation of impulse currents, tripping and control of impulse generators.

UNIT III

MEASUREMENT OF HIGH VOLTAGES AND CURRENTS: Measurement of high direct current voltages, measurement of high alternating and impulse voltages, measurement of high direct, alternating and impulse currents, Cathode Ray Oscillograph for impulse voltage and current measurements.

UNIT IV

NON-DESTRUCTIVE TESTING: Measurement of direct current resistivity, measurement of dielectric constant and loss factor, partial discharge measurements.

HIGH VOLTAGE TESTING: Testing of Insulators and Bushings, testing of Isolators and Circuit Breakers, testing of Cables, testing of Transformers, testing of Surge Arresters, leakage current monitoring test of Surge Arrester, Testing of CVT and VT, radio interference measurement.

UNIT V

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 travelling 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

Text Book(s)

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. Subir Ray, "An Introduction to High Voltage Engineering", Prentice Hall of India.

Reference Book(s)

1. Rokosh Das Begamudre- EHV AC. Transmission Engineering, Wiley Easter Ltd. New Delhi.
2. E. Kuffel and W. S. Zacngai, "High Voltage Engineering", Pergamon Press.
3. M. P. Chaurasia, "High Voltage Engineering", Khanna Publishers.
4. R. S. Jha, "High Voltage Engineering", Dhanpat Rai and Sons.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
EE 703	TESTING and COMMISSIONING OF ELECTRICAL MACHINES	3	0	2	4

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

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

Syllabus (Theory)

UNIT I

TRANSFORMERS: Testing procedure for HV testing ,Phase shifting/ phase group , Radio interference, Ratio Test , Load loss ,Separate source voltage testing ,Induced voltage testing , Impulse and Surge testing , Noise level and vibration testing , Short circuit withstand test ,Tan Delta test , Core insulation voltage test, Measurement of impedance ,Testing of auxiliaries and safety device , Oil testing ,Classification of testing methods , Testing of bushing. DC and AC Resistance measurement, Temp. Rise test, Short circuit test, Dielectric test, Partial discharge, Insulation resistance testing. Polarity testing, Short time current rating, Impulse and surge testing, Determination of error and accuracy class, Power frequency voltage withstand test, over voltage inter-turn test. Determination of polarization index for transformer. Drying out procedure for transformer. Commissioning steps for transformer, Purification and Filtration Procedure.

UNIT II

INDUCTION MOTOR: TESTING (3-PHASE and 1-PHASE): Hammer test, Testing against variation of voltage/current/frequency, Load test, NL and BR test, DC and AC, Resistance measurement, Insulation measurement, Starting test, Temp. Rise test, Slip measurement, HV test, testing on auxiliaries, Vibration Test, Noise level test. Drying out methods / Polarization Index / Hot Temperature measurement Degree of protection (IP Grade) Commissioning steps for Induction motor, Heat Run Test. Commissioning of Induction Generator. Troubleshooting and maintenance of induction motor.

UNIT III

SUBSTATION EQUIPMENTS: Bus bar Temp. Rise test, Rated short time current test, HV test, Power frequency voltage withstand test, Impulse / surge testing, Vibration.

EARTHING: Earthing resistance measurement, Substation grid Earthing, Soil resistivity measurement.

ISOLATOR TESTING: Temp. Resistance test, Short circuit test, charging current making and breaking test, Inductive current making and breaking test.

UNIT IV

CIRCUIT BREAKER: TESTING OF HV/LV CIRCUIT BREAKER: No load Mechanical Operation, Mechanical endurance test, Temp. Rise test, Impulse and surge testing, short time current test. Short circuit making and breaking test, Line Charging current making and breaking test, Cable charging and capacitor bank making and breaking test, Out of phase switching, Short line fault test, and Electrical and Mechanical endurance test for LT switch gear like MCB / MCCB / ELCB etc. C.T. and P.T. Testing, Relay testing, Coupling capacitors, Station Batteries for DC Supply, Fire Shifting Equipments. Testing and Commissioning of Lightning Arrestor, Substation Commissioning by Thermograph. Troubleshooting and maintenance of circuit breakers.

UNIT V

COMMISSIONING OF TRANSMISSION LINE and CABLE: De-rating of cable capacity, HV test, AC and DC Resistance check, Insulation resistance, Impedance measurement, Location finding technique for fault in underground cables (Murray loop test and Warley loop test), Testing of open circuit faults in cables. Line charging, loading and Dropping.

Syllabus (Practical)

1. Measurement of IR Value for Three Phase and Single Phase Transformer.
2. Measurement of IR Value for Three Phase IM.
3. Measurement of IR Value for Synchronous Machine.
4. Measurement of X0 and X2 for synchronous Machines.
5. Measurement of Poles for IM.
6. Tan (δ) Measurement Test for Transformer.
7. Measurement of Direct axis Sub-transient and Transient Reactance for synchronous Machines .
8. Testing of Induction Motor.

Text Book(s)

1. S. Rao, "Testing, Commissioning, Maintenance and Operation of Electrical Equipments", Khanna Tech. Publications.

Reference Book(s)

1. R C H Richardson, "The Commissioning of Electrical Plant", Chapman and Hall

SEMINAR

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
SEM701	Seminar	0	0	4	2

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

Syllabus (Practical)

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.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
EE 721(Elective-III)	Power Quality & Utilization of Electrical Power	3	1	0	4

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks
20	20	40	10	10	100	-	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Syllabus (Theory)

UNIT I

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

UNIT II

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.

UNIT III

UTILIZATION OF ELECTRICAL POWER

- **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
- **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.

- **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.

UNIT IV

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

Text Book(s)

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.

Reference Book(s)

1. Soni, Gupta, Bhatnagar: Electrical Power System – Dhanpat Rai & Sons.
2. Partab H: Art and Science of Utilization of Electrical Energy, Dhanpat Rai & Sons.
3. E.Openshaw Taylor – Utilisation of Electric Energy – Orient Longman, Pitman Publications.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
EE 722(Elective-III)	High Power Semiconductor Devices	3	1	0	4

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**
20	20	40	10	10	100	-	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Syllabus (Theory)

UNIT I

BASIC DEVICE MODELS: Theory of bipolar and MOS transistors. Small-signal models of bipolar and MOS transistors, Gummel-Poon model

UNIT II

HIGH CURRENT EFFECTS IN DIODES: Dependence of lifetime on high-level injection, non-uniform current distribution under high current injection.

UNIT III

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.

UNIT IV

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

UNIT V

POWER MOS DEVICES :VMOS & DMOS device structure and models; device packaging.

Text Book(s)

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

Reference Book(s)

1. B Jayant Baliga ,Power Semiconductor Devices , Hardcover, PWS Publication

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
EE 723(Elective-III)	Flexible AC Transmission System	3	1	0	4

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**
20	20	40	10	10	100	-	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Syllabus (Theory)

UNIT I

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.

UNIT II

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.

UNIT III

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).

UNIT IV

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.

Text Book(s)

1. Flexible ac transmission systems (FACTS) by Y.H. Song, and Allan T. Johns Institution of Electrical Engineers Press, London, 1999.
2. 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.
3. FACTS controllers for transmission and Distribution systems by K.R.Padiyar New Age international Publishers.

Reference Book(s)

1. Concepts and Technology of flexible ac transmission system Hingorani , L.Gyugyi IEEE Press New York, 2000 ISBN –078033 4588.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
EE 724 (Elective-III)	Advanced PID Control	3	1	0	4

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**
20	20	40	10	10	100	-	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Syllabus (Theory)

UNIT I

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.

UNIT II

PID Stabilization & Controller Design: I, PID stabilization – characterization and computation, 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.

UNIT III

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

UNIT IV

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

Text Book(s)

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.

Reference Book(s)

1. Q.G. Wang, Z. Ye, W.J. Cai, C.C. Hang, PID control for Multivariable Process, Springer, 2008.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
EE 725(Elective-III)	Electrical Machine Design	3	1	0	4

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**
20	20	40	10	10	100	-	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Syllabus (Theory)

UNIT I

BASIC CONSIDERATIONS IN ELECTRICAL MACHINES DESIGN: Design factors, Limitations in design,Modern trends in design of electric machines, Conducting materials, Magnetic materials, Insulating materials and its classification. Temperature rise, Expression for temperature rise, heating and cooling time constants, examples. Types of duties and ratings, Types of enclosure, Selection of motor capacity,examples. Cooling of machines.

UNIT II

DESIGN OF TRANSFORMER: Specification, Output equation of transformer, Output equation- Volt per turn. Stacking factor, Ratio of iron loss to copper loss, Relation between core area and weight of iron and copper. Optimum designs, variation of output and losses in transformer with linear dimensions,examples. Design of core, Choice of flux density and current density, Choice of window space factor,window dimensions. Design of yoke, Overall dimensions, examples. Design of high voltage and low voltage winding, examples. Estimation of operating characteristics: Primary and Secondary resistance,Leakage reactance of windings, Regulation, examples. Mechanical forces, No load current calculation,Change of parameters with change of frequency. Temperature rise of transformer, Design of tank, examples. Design of Current Transformer: Introduction, construction, design principles, turns compensation.

UNIT III

WINDINGS OF ELECTRICAL MACHINES: Types of transformer windings. D.C. Armature Winding: Types of dc winding, terms related to armature winding, comparison between closed and open winding,simplex lap and wave winding, Duplex lap and wave winding, Dummy coils in wave winding, Equalizer connections, examples.

A.C. ARMATURE WINDING: Number of phases and phase spread, classification of ac winding, Concentric winding, Mesh winding, Integral slot winding, Fractional slot winding, examples.

UNIT IV

DESIGN OF DIRECT CURRENT MACHINES: Field form, Carter's Fringe curves Specifications, Main Dimensions, Total Loadings, Specific Loadings, Choice of Specific Magnetic Loading,Choice of Specific

Electrical Loading, Interdependance of Bav and ac Output equation, Factors affecting size of machines, Seperation of DandL Selection of number of poles, examples Core length, Armature diameter, Pole proportions, Number of ventilacting ducts, Estimation of Length of air gap, examples. Armature reaction and its effects, Reduction of effects of armature reaction.

ARMATURE DESIGN: Number of armature conductiors, Number of armature coils, Number of armature slots, Cross section area of conductors, Slot dimensions, Armature volatge drop, Depth of armature core, examples. Design of Yoke, Magnetic circuit. Design of field system, Design of shunt and series winding, examples. Improvement in commutation Design of Interpoles, Desing of Commutator and Brushes, examples.

Text Book(s)

1. A. K. Sawhney and A. Chakrabarti, "A course in Electrical machine design" Dhanpat Rai and Co.
2. V. N. Mittal and A. Mittal, "Design of electrical machines", Standard Publishers distributors.
3. A. E. Fitzerald, Charles Kingsley, Stephen. D. Umans, "Electric Machinery" 6th Edition, Tata Mcgraw
   Hill.

Reference Book(s)

1. M. G. Say, "The performance and design of alternating current machines", CBS Publishers and Distributors Computer aided design : By Say & Sinha
2. Juha Pyrhonen, Tapani Jokinen, Valeria Hrabovsova, "Design of rotating electrical machines" Wiley publication

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
EE 726(Elective-III)	Communication Systems & Networks	3	1	0	4

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**
20	20	40	10	10	100	-	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Syllabus (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.

Text Book(s)

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., "Principles of Communication Systems", Tata McGraw Hill, 2001.
4. R G Gallager and D Bertsekas, Data Networks, Prentice Hall of India, 1992

Reference Book(s)

1. W Stallings, Data and Computer Communications, Prentice Hall of India, 1997.
2. J F Hayes, Modelling and Analysis of Computer Communication Networks, Plenum Publishing Corporation, New York, 1984.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
CSE 728 (Elective IV)	Digital Image Processing	3	0	0	3

Evaluation Scheme (Theory)										
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	-	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Syllabus (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.

Text Books:

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

Reference Books:

1. Chanda and D. Dutta Majumder, "Digital Image Processing and Analysis", PHI Publication.

2. Madhuri A. Joshi, "Digital Image Processing – An Algorithmic Approach, PHI Publication.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
ECE722(Elective-IV)	Biomedical Engineering	3	0	0	3

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	-	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Syllabus (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

Text Books:

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

Reference Books:

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

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
ECE726 (Elective-IV)	VERILOG HARDWARE DESCRIPTION LANGUAGE	3	0	0	3

Evaluation Scheme (Theory)					
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks*
20	20	40	10	10	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Syllabus (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.

Text Books:

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

Reference Books:

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

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
ECE725 (Elective-III)	IC Technology	3	0	0	3

Evaluation Scheme (Theory)					
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks*
20	20	40	10	10	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

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.

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

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
ECE729 (Elective-IV)	Information Theory & Coding	3	0	0	3

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Course Syllabi (Theory):

- Information theory – Concept of amount of information -units, Entropy -marginal, conditional and joint entropies -relation among entropies Mutual information, information rate, channel capacity, redundancy and efficiency of channels.
- Discrete channels – Symmetric channels, Binary Symmetric Channel, Binary Erasure Channel, Cascaded channels, repetition of symbols, Binary unsymmetrical channel, and Shannon theorem. Continuous channels – Capacity of band limited Gaussian channels, Shannon-Hartley theorem, Tradeoff between band width and signal to noise ratio, Capacity of a channel with infinite band width, Optimum modulation system.
- Source coding – Encoding techniques, Purpose of encoding, Instantaneous codes, Construction of instantaneous codes, Kraft's inequality, Coding efficiency and redundancy, Noiseless coding theorem. Construction of basic source codes – Shannon-Fano algorithm, Huffman coding, Arithmetic coding, ZIP coding.
- Codes for error detection and correction – Parity check coding, Linear block codes, Error detecting and correcting capabilities, Generator and Parity check matrices, Standard array and Syndrome decoding, Hamming codes, Encoding and decoding of systematic and unsystematic codes. Cyclic codes – Generator polynomial, Generator and Parity check matrices, Encoding of cyclic codes, Syndrome computation and error detection, Decoding of cyclic codes, BCH codes, RS codes, Burst error correction.
- Convolutional codes – Encoding- State, Tree and Trellis diagrams, Maximum likelihood decoding of convolutional codes -Viterbi algorithm, Sequential decoding -Stack algorithm. Interleaving techniques – Block and convolutional interleaving, Coding and interleaving applied to CD digital audio system - CIRC encoding and decoding, interpolation and muting. ARQ – Types of ARQ, Performance of ARQ, Probability of error and throughput.

Text Books:

1. Communication Systems by Simon Haykin, John Wiley & Sons. Pvt. Ltd.
2. Principles of Communication Systems by Taub & Schilling, Tata McGraw-Hill
3. Principles of Digital Communication by Das, Mullick & Chatterjee, Wiley Eastern Ltd

Reference Books:

1. Error Control Coding Fundamentals and Applications by Shu Lin & Daniel J. Costello Jr., Prentice Hall Inc.
2. Digital Communications Fundamentals and Applications by Bernard Sklar, Person Education Asia

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
HS 701	Principles of Economics	3	0	0	3

Evaluation Scheme (Theory)					
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks*
20	20	40	10	10	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations /Mock Interviews/others

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 macroeconomics; Foreign Exchange rate and Balance of payments.

Text Books:

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

Reference Books:

1. D N Dwivedi "Principles of Economics", Vikas Publishing House Pvt Ltd.
2. 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 2014-2018

SEMESTER-EIGHT

Detailed Syllabus

&

Scheme of Examination

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
PS801	Practice School - II	-	-	-	16

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation	Total Marks	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks
-	-	-	-	-	-	-	-	-	-	-

**** Duration for practice school is Five and a half month**

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: 2014-18

Credit Change: 1. ECE501 (5 to 4)

Any Other Discrepancy:

1. In detailed syllabus Engineering Drawing course code change from CE101 to CE102.

2. In detailed syllabus Microprocessor and Interfacing code change from ECE604 to ECE622.

3. In detailed syllabus Digital Image Processing code change from CSE728 to CSE721.

5. In semester 5^{th} total credit 30 changed 29.

6. Total credit of course structure from 189.5 to 188.5.

Signature