USHARAMA

COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

(Approved by A.I.C.T.E & Permanently Affiliated to JNTU, Kakinada)
Accredited by NAAC with "A" Grade
on NH 16, Telaprolu, Krishna Dist – 521109

B.TECH
ELECTRICAL & ELECTRONICS ENGINEERING
FRESHERS HAND BOOK

(Applicable for the batches admitted from the Academic Year 2019-20)

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Course Structure
Electrical and Electronics Engineering
(Applicable for batches admitted from 2019-2020)

I SEMESTER								
S. No	**Course Category**	**Course Code**	**Course Title**	**L**	**T**	**P**	**Contact Hrs./wk**	**C**
1	HMC	UR19HM101	Communicative English	2	0	0	2	2
2	BSC	UR19BSC101	Linear Algebra & Calculus	3	1	0	4	4
3	BSC	UR19BSC108	Applied Physics	3	0	0	3	3
4	ESC	UR19ESC108	Engineering Graphics & Drafting	1	0	3	4	2.5
5	ESC	UR19ESC109	Fundamental of Computer Science	3	0	0	3	3
6	HMC	UR19HML101	Communicative English Lab	0	0	2	2	1
7	BSC	UR19BSCL102	Applied Physics Lab	0	0	3	3	1.5
8	ESC	UR19ESCL101	Engineering Workshop and IT Workshop	0	0	3	3	1.5
MANDATORY COURSE								
9	MC	UR19MC102	Applied Physics-Virtual Lab*	0	0	0	2	0
Total				**12**	**1**	**11**	**26**	**18.5**
***Internal evaluation**								

II SEMESTER								
S. No	**Course Category**	**Course Code**	**Course Title**	**L**	**T**	**P**	**Contact Hrs./wk**	**C**
1	HMC	UR19HM202	Professional English	2	0	0	2	2
2	BSC	UR19BSC205	Differential Equations & Vector Calculus	3	0	0	3	3
3	BSC	UR19BSC203	Numerical Methods and Transforms	3	0	0	3	3
4	BSC	UR19BSC210	Applied Chemistry	3	0	0	3	3
5	ESC	UR19ESC202	Electrical Circuit Analysis-I	3	0	0	3	3
6	ESC	UR19ESC210	Problem Solving & Programming Using C	3	0	0	3	3
7	HMC	UR19HML202	Professional English Lab	0	0	3	3	1.5
8	BSC	UR19BSCL203	Engineering and Applied Chemistry Lab	0	0	3	3	1.5
9	ESC	UR19ESCL202	Problem Solving & Programming Using C Lab	0	0	3	3	1.5
	MANDATORY COURSES							
10	MC	UR19MC200	Engineering Exploration Project*	0	0	0	1	0
11	MC	UR19MC203	Constitution of India	0	0	0	2	0
Total				**17**	**0**	**9**	**29**	**21.5**
***Internal evaluation**								

III SEMESTER								
S. No	**Course Category**	**Course Code**	**Course Title**	**L**	**T**	**P**	**Contact Hrs./wk**	**C**
1	PCC	UR19PCEE301	Electrical Machines-I	3	1	0	4	4
2	PCC	UR19PCEE302	Electrical Circuit Analysis-II	3	0	0	3	3
3	PCC	UR19PCEE303	Electromagnetic Field	2	1	0	3	3
4	PCC	UR19PCEE304	Electronic Devices and Circuits	3	0	0	3	3
5	PCC	UR19PCEE305	Thermal and Hydro Prime Movers	2	0	0	2	2
6	HMC	UR19HM301	Managerial Economics and Financial Analysis	3	0	0	3	3
7	PCC	UR19PCEEL301	Electrical Circuit and Pspice Lab	0	0	3	3	1.5
8	PCC	UR19PCEEL302	Thermal and Hydro Lab	0	0	3	3	1.5
	MANDATORY COURSE							
9	MC	UR19MC301	Environmental Studies	0	0	0	2	0
Total				**16**	**2**	**6**	**26**	**21**
Employability Skills- I*							2	0
***Internal evaluation**								

IV SEMESTER								
S. No	**Course Category**	**Course Code**	**Course Title**	**L**	**T**	**P**	**Contact Hrs./wk**	**C**
1	PCC	UR19PCEE401	Electrical Machines-II	3	1	0	4	4
2	PCC	UR19PCEE402	Power Systems-I	3	0	0	3	3
3	PCC	UR19PCEE403	Control Systems	2	1	0	3	3
4	PCC	UR19PCEE404	Switching Theory and Logic Design	3	0	0	3	3
5	PCC	UR19PCEE405	Electrical Measurements	3	0	0	3	3
6	PCC	UR19PCEEL401	Electrical Machines-I Lab	0	0	3	3	1.5
7	PCC	UR19PCEEL402	Electronic Devices and Circuits Lab	0	0	3	3	1.5
MANDATORY COURSE								
1	PROJ	UR19MPROJ401	Mini Project	0	0	0	2	0
Total				**14**	**2**	**6**	**26**	**19**
Self Learning *(Technical Certificate)							1	**0**
***Internal evaluation**								

V SEMESTER								
S. No	**Course Category**	**Course Code**	**Course Title**	**L**	**T**	**P**	**Contact Hrs./wk**	**C**
1	PCC	UR19PCEE501	Linear and Digital IC Applications	3	0	0	3	3
2	PCC	UR19PCEE502	Power Systems-II	3	0	0	3	3
3	PCC	UR19PCEE503	Power Electronics	3	0	0	3	3
4	PCC	UR19PCEE505	Signals and Systems	3	0	0	3	3
Professional Elective – I								
5	PEC	UR19PEEE501	Industrial Drives and Application	3	0	0	3	3
		UR19PEEE502	Smart Grid					
		UR19PEEE503	Renewable Energy sources					
6	PCC	UR19PCEEL501	Electrical Machines-II Lab	0	0	3	3	1.5
7	PCC	UR19PCEEL502	Electrical Measurements Lab	0	0	3	3	1.5
8	PCC	UR19PCEEL503	Control Systems Lab	0	0	3	3	1.5
MANDATORY COURSE								
9	MC	UR19MCL501	Virtual Electrical Machines Lab*	0	0	0	2	0
Total				**15**	**0**	**9**	**26**	**19.5**
Employability Skills- II*							2	0
Self Learning *(Technical Certificate)							2	0
***Internal evaluation**								

VI SEMESTER								
S. No	**Course Category**	**Course Code**	**Course Title**	**L**	**T**	**P**	**Contact Hrs./wk**	**C**
1	PCC	UR19PCEE601	Power Systems Analysis	3	0	0	3	3
2	HMC	UR19HM 601	Management Science	3	0	0	3	3
3	PCC	UR19PCEE603	Electrical Drives	3	0	0	3	3
4	PCC	UR19PCEE504	Microprocessors and Microcontrollers	3	0	0	3	3
Professional Elective – II								
5	PEC	UR19PEEE601	Design of Electrical Apparatus	3	0	0	3	3
		UR19PEEE602	Electric Machine design					
		UR19PEEE603	Electrical Materials					
6	OEC	---	**Open Elective-I**	3	0	0	3	3
7	PCC	UR19PCEEL601	Power Electronics Lab	0	0	3	3	1.5
8	PCC	UR19PCEEL602	Microprocessors and Microcontrollers Lab	0	0	3	3	1.5
			MANDATORY COURSES					
9	MC	UR19MC601	Essence of Indian Traditional Knowledge	0	0	0	2	0
10	MC	UR19MCL602	Virtual Power Lab*	0	0	0	2	0
12	PROJ	UR19MPROJ603	Mini Project	0	0	0	2	0
Total				**18**	**0**	**6**	**30**	**21**
***Internal evaluation**								

VII SEMESTER								
S. No	**Course Category**	**Course Code**	**Course Title**	**L**	**T**	**P**	**Contact Hrs./wk**	**C**
1	PCC	UR19PCEE701	Switch Gear and Protection	3	0	0	3	3
2	PCC	UR19PCEE702	Utilization of Electrical Energy	3	0	0	3	3
Professional Elective – III								
3	PEC	UR19PEEE701	Digital Control Systems	3	0	0	3	3
		UR19PEEE702	Electrical and Electronics Instrumentation					
		UR19PEEE703	Electrical Distribution System					
Professional Elective – IV								
4	PEC	UR19PEEE704	Advanced Control Systems	3	0	0	3	3
		UR19PEEE705	Special Electrical Machines					
		UR19PEEE706	HVDC & EHV AC Transmission System					
5	OEC	---	**Open Elective – II**	3	0	0	3	3
7	PCC	UR19PCEEL701	Power Systems Lab	0	0	3	3	1.5
8	PCC	UR19PCEEL702	Electrical Simulation Lab	0	0	3	3	1.5
10	PROJ	UR19PROJEE711	Internship	0	0	0	0	2
11	PROJ	UR19PROJEE701	Project Stage-I	0	0	3	0	1.5
Total				**15**	**0**	**9**	**21**	**21.5**

VIII SEMESTER								
S. No	**Course Category**	**Course Code**	**Course Title**	**L**	**T**	**P**	**Contact Hrs./wk**	**C**
1	PCC	UR19PCEE801	Power System Operation and Control	3	0	0	3	3
Professional Elective – V								
2	PEC	UR19PEEE801	FACTS	3	0	0	3	3
		UR19PEEE802	Power System Deregulation					
		UR19PEEE803	High Voltage Engineering					
3	OEC	---	**Open Elective – III**	3	0	0	3	3
4	PROJ	UR19PROJEE801	Project Stage-II	0	0	18	18	9
Total				**9**	**0**	**18**	**27**	**18**

Total Credits = 18.5+21.5+21+19+19.5+21+21.5+18=160

List of Open Electives

Open Electives offered by the Dept. of CE

S.No.	Course Code	Open Elective-I
1.	UR19OECE 601	Introduction To GIS
2.	UR19OECE 602	Environmental Pollution Control
	Course Code	**Open Elective-II**
3.	UR19OECE701	Metro Systems and Engineering
4.	UR19OECE702	Natural Disaster Mitigation and Management
	Course Code	**Open Elective-III**
5.	UR19OECE801	Sanitary and Public Health Engineering
6.	UR19OECE802	Environmental and Industrial Hygiene

Open Electives offered by the Dept. of EEE

S.No.	Course Code	Open Elective-I
1.	UR19OEEE601	Neural Networks and Fuzzy Logic
2.	UR19OEEE602	Linear Control Systems
3.	UR19OEEE603	Electrical Safety Management
	Course Code	**Open Elective – II**
4.	UR19OEEE701	Programmable Logic Controllers
5.	UR19OEEE702	Energy Audit and Conservation Management
6.	UR19OEEE703	Electrical Technology
	Course Code	**Open Elective – III**
7.	UR19OEEE801	Non Conventional Energy Sources
8.	UR19OEEE802	Industrial Electrical Operation
9.	UR19OEEE803	Hybrid Electric Vehicles

Open Electives offered by the Dept. of ME

S.No.	Course Code	Open Elective-I
1.	UR19OEME601	Nano Technology
2.	UR19OEME602	Robotics
3.	UR19OEME603	Power Plant Engineering
	Course Code	**Open Elective-II**
4.	UR19OEME701	Operations Research
5.	UR19OEME702	Industrial Engineering & Quality control
6.	UR19OEME703	Advanced materials
	Course Code	**Open Elective-III**
7.	UR19OEME801	Optimization Techniques
8.	UR19OEME802	Green Engineering systems
9.	UR19OEME803	Mechatronics

Open Electives offered by the Dept. of ECE

S.No.	Course Code	Open Elective-I
1	UR19OEEC601	Consumer Electronics
2	UR19OEEC602	Digital Electronics
	Course Code	**Open Elective-II**
3	UR19OEEC701	Embedded Systems
4	UR19OEEC702	Internet of Things (IoT)
	Course Code	**Open Elective-III**
5	UR19OEEC801	Microcontrollers
6	UR19OEEC802	Principles of Electronic Communications

Open Electives offered by the Dept. of CSE

S.No.	Course Code	Open Elective-I
1.	UR19OECS601	Java Programming
2.	UR19OECS602	Data Base Management Systems
3.	UR19OECS603	C++ Programming
	Course Code	**Open Elective-II**
4.	UR19OECS701	Distributed Computing
5.	UR19OECS702	Deep Learning
6.	UR19OECS703	AI and ML for Robotics
	Course Code	**Open Elective-III**
7.	UR19OECS801	AI Tools & Techniques
8.	UR19OECS802	Information Security
9.	UR19OECS803	Big Data

Open Electives offered by the Dept. of IT

S.No.	Course Code	Open Elective-I
1.	UR19OEIT101	Data Structures
2.	UR19OEIT102	Computer Graphics
3.	UR19OEIT103	Data Science
	Course Code	**Open Elective – II**
4.	UR19OEIT201	Operating Systems
5.	UR19OEIT202	Python Programming
6.	UR19OEIT203	Web Technologies
	Course Code	**Open Elective – III**
7.	UR19OEIT301	Information Security
8.	UR19OEIT302	Mobile Application Development
9.	UR19OEIT303	Block Chain Technologies

I Year - I Semester	Course Code : UR19HM101	L	T	P	C
		2	0	0	2

Internal: 30 Marks External: 70 Marks

COMMUNICATIVE ENGLISH

(Common to all branches)

Course Objectives:

- Recall and improve the language proficiency of the students in English
- Paraphrase and interpret the ideas and thoughts in a dynamic way
- Prioritize the importance of practical learning of English
- Distinguish the various levels of Listening, Speaking, Reading and writing skills
- Construct statements in writing and speaking in professional manner

UNIT – I
Poem: "Life" by Sarojini Naidu
Grammar: Articles
Vocabulary: Prefixes and Suffixes
Writing: Paragraph Writing
Life-Skills: Attitude

UNIT – II
Essay: A Drawer full of Happiness
Grammar: Prepositions
Vocabulary: Homonyms, Homophones, Homographs
Writing: Letter of Request and Apology
Life-Skills: Self- Management

UNIT – III
Short Story: "Half a Rupee Worth" by R.K. Narayan
Grammar: Tenses
Vocabulary: Idiomatic Expressions; Phrasal Verbs
Writing: Letter of Complaint and Appreciation
Life-Skills: Body Language

UNIT – IV
Text: Stephen Hawking – Positivity 'Benchmark'
Grammar: Question Tags, Conjunctions
Vocabulary: One - Word Substitutes, Collocations
Writing: Dialogue and Speech Writing
Life-Skills: Being Assertive

UNIT – V
Poem: Once Upon a Time by Gabriel Okara
Grammar: Degrees of Comparison
Vocabulary: Technical Abbreviations
Writing: E-mail Writing, Preparation of Resume and Letter of application
Life-Skills: Goal Setting, Working in a Team

TEXT BOOK:
'InfoTech English' – Maruti Publications

REFERENCE BOOKS:

Raymond Murphy, "Murphy's Essential English Grammar" with CD, Cambridge University Press
Practical English Usage, Michael Swan, OUP, 1995

NPTEL ONLINE COURSE:

'Enhancing Soft skills & Personality Development

Course Outcomes:

CO1: Apply critical-thinking to develop writing skills
CO2: Understand and evaluate different kinds of prose tests.
CO3: Describe distinct literary characteristics of poems.
CO4: Analyze the major and minor details of a biography.
CO5: Develop grammar and vocabulary skills
CO6: Evaluate the effectiveness in improving life-skills.

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I Year - I Semester	Course Code : UR19BSC101	L	T	P	C
		3	1	0	4

Internal: 30 Marks External: 70 Marks

LINEAR ALGEBRA & CALCULUS

(Common to all branches)

Course Objectives:

- This course will illuminate the students in the concepts of calculus and linear algebra.
- To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their applications.

UNIT – I

Matrices: Solving system of homogeneous and non-homogeneous linear equations by Gauss elimination method. Eigen values and Eigen vectors and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem.

UNIT – II

Sequences and Series: Convergence and divergence, Ratio test - Comparison test -Cauchy's root test-. Fourier series, Euler's formulae, conditions for Fourier expansion, Even and Odd functions.

UNIT – III

Mean Value Theorems: Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (single variable & without proofs).

UNIT – IV

Multivariable calculus: Partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers.

UNIT – V

Multiple Integrals: Double integrals, change of order of integration, double integration in polar coordinates. Evaluation of triple integrals, change of variables.

TEXT BOOK:

1. Higher Engineering Mathematics, B.S.Grewal, Khanna Publishers

Course Outcomes:

CO1: Develop the use of matrix algebra techniques that is needed by engineers for practical Applications

CO2: Find or compute the Fourier series of Fourier series periodic signals.

CO3: Utilize mean value theorems to real life problems.

CO4: Translate the given function as series of Taylor's and Maclaurin's with remainders.

CO5: Familiarize with functions of several variables which are useful in optimization.

CO6: Apply Double integration in evaluating areas bounded by regions.

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I Year - I Semester Course Code : UR19BSC108

L	T	P	C
3	0	0	3

Internal: 30 Marks External: 70 Marks

APPLIED PHYSICS

(EEE & ECE)

Course Objectives:

- Impart Knowledge of Physical Optics phenomena like Interference and Diffraction required to design instruments with higher resolution.
- Understand the physics of Semiconductors and their working mechanism for their utility in sensors.
- Impart the knowledge of materials with characteristic utility in appliances.

UNIT – I

INTERFERENCE: Principle of Superposition – Coherent Sources – Interference in thin films (reflection geometry) – Newton's rings.

DIFFRACTION: Diffraction - Fraunhofer Diffraction - Diffraction due to Single slit (quantitative), Double slit, N -slits and circular aperture (qualitative) – Intensity distribution curves - Diffraction Grating – Grating spectrum – missing order – resolving power – Rayleigh's criterion – Resolving powers of Microscope, Telescope and grating (qualitative).

UNIT – II

QUANTUM MECHANICS: Introduction – Matter waves – de Broglie's hypothesis – Davisson-Germer experiment – G.P.Thomson experiment – Heisenberg's Uncertainity Principle –interpretation of wave function – Schröedinger Time Independent and Time Dependent wave equations – Particle in a potential box.

UNIT – III

FREE ELECTRON THEORY & BAND THEORY OF SOLIDS : Introduction – Classical free electron theory (merits and demerits only) - Quantum Free electron theory – electrical conductivity based on quantum free electron theory – Fermi Dirac distribution function – Temperature dependence of Fermi-Dirac distribution function - expression for Fermi energy -Density of states.

Bloch's theorem (qualitative) – Kronig-Penney model(qualitative) – energy bands in crystalline solids – E Vs K diagram – classification of crystalline solids – effective mass of electron – m^* Vs K diagram - concept of hole.

UNIT – IV

SEMICONDUCTOR PHYSICS: Introduction – Intrinsic semi conductors - density of charge carriers - Electrical conductivity – Fermi level – extrinsic semiconductors - p-type & n-type - Density of charge carriers - Dependence of Fermi energy on carrier concentration and temperature – Hall effect- Hall coefficient - Applications of Hall effect - Drift and Diffusion currents – Einstein's equation.

UNIT – V

MAGNETISM & DIELECTRICS: Introduction – Magnetic dipole moment – Magnetization – Magnetic susceptibility and permeability – Origin of permanent magnetic moment – Bohr magneton – Classification of magnetic materials: Dia, para & Ferro – Domain concept of Ferromagnetism - Hysteresis – soft and hard magnetic materials – applications of Ferromagnetic material.

Introduction - Dielectic polarization **–** Dielectric Polarizability, Susceptibility and Dielectric constant-types of polarizations: Electronic and Ionic (Quantitative), Orientational polarizations (qualitative) – Lorentz Internal field – Claussius-Mossoti equation - Frequency dependence of polarization – Applications of dielectrics.

TEXT BOOKS:

1."A Text book of Engineering Physics" by M.N.Avadhanulu,P.G.Kshirsagar - S.Chand Publications, 2017.
2. "Engineering Physics" by D.K.Bhattacharya and Poonam Tandon, Oxford press (2015).
3. "Engineering Physics" by R.K Gaur. and S.L Gupta., - Dhanpat Rai publishers, 2012.

REFERENCE BOOKS:

1. Applied Physics by P.K. Palanisamy, Scitech publications (2014).
2. Lasers and Non-Linear optics by B.B. Laud, New Age International Publishers (2008).
3. Engineering Physics by M. Arumugam, Anuradha Publication (2014).
4. Physics for Engineers by M.R. Srinasan, New Age international publishers (2009).

Course Outcomes:

CO1: Explain the need of coherent sources and the conditions for sustained interference and illustrate the resolving power of various optical instruments.
CO2: Explain the fundamental concepts of quantum mechanics and analyze the physical significance Of wave function.
CO3: Explain the various electron theories and interpret the effects of temperature on Fermi Dirac distribution function
CO4: Explain the various energy bands
CO5: Classify the energy bands of semiconductors and outline the properties of n-type and p-type Semiconductors.
CO6: Explain the applications of dielectric and magnetic materials.

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I Year - I Semester Course Code : UR19ESC108

L	T	P	C
1	0	3	2.5

Internal: 30 Marks External: 70 Marks

ENGINEERING GRAPHICS & DRAFTING
(CIVIL/EEE/ECE)

PRE-REQUISITES: Mathematics, Physics

COURSE EDUCATIONAL OBJECTIVE

- Engineering drawing being the principle method of communication for engineers, the objective is to introduce the students, the techniques of constructing the various types of polygons, curves and scales. The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scaling etc.

UNIT – I INTRODUCTION TO ENGINEERING DRAWING:

Introduction: Principles of Engineering Graphics and their significance - Drawing Instruments - Geometrical Constructions.

Polygons: Constructing regular polygons by general methods, inscribing and describing polygons on circles.

Curves: Ellipse ,Parabola and Hyperbola by general methods,

Scales: Diagonal scales and Vernier scales

UNIT – II

ORTHOGRAPHIC PROJECTIONS: Principle of orthographic projection-Method of Projections – First and third angle projection methods Projections of Points – Projections of straight lines of different orientations - True lengths and traces.

UNIT – III

PROJECTIONS OF PLANES & SOLIDS: Regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes. Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes.

UNIT – IV

ISOMETRIC VIEWS: Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

UNIT – V

COMPUTER AIDED DRAFTING: Introduction – Computer Aided drafting system – Advantages, Applications of AUTOCAD, Drafting software-AUTOCAD-Advantages, Initial setup commands, utility commands, Drawing Aids, Entity Draw commands, Display commands, Edit commands, Lettering & Dimensioning

TEXT BOOKS:

1.N. D. Bhatt, Engineering Drawing, Revised and Enlarged Edition, Charotar publishers,
2. Engineering Drawing by Agarwal & Agarwal, Tata McGraw Hill Publishers
3. Engineering Drawing + AutoCad – K Venugopal, V. Prabhu Raja, New Age

REFERENCE BOOKS:

1. Engineering Drawing by K.L.Narayana & P. Kannaiah, Scitech Publishers
2. Engineering Graphics for Degree by K.C. John, PHI Publishers
3. Engineering Graphics by PI Varghese, McGrawHill Publishers

Course Outcomes:

CO1: Represent the geometrical objects considering BIS standards.
CO2: Comprehend the basics of orthographic projections and deduce orthographic projections
of a point and a line at different orientations.
CO3: Visualize geometrical planes of different positions in real life environment
CO4: Draw the projection of various of types of solids.
CO5: Imagine orthographic views of various solid objects at different orientations
CO6: Recognize the significance of isometric drawing to relate 2D environment with 3D environment. Learn basics of CAD.

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I Year - I Semester	Course Code : UR19ESC109	L	T	P	C
		3	0	0	3

Internal: 30 Marks External: 70 Marks

FUNDAMENTALS OF COMPUTER SCIENCE
(EEE/CSE/IT)

Course Objectives:

To study different types and working of a digital computer.

- To learn different number systems and representation of floating point numbers.
- To understand the need and working of memory and other peripheral devices.
- To be familiar with the internal organization of a computer.
- To study the interconnection of computers and applications of computer.

UNIT – I INTRODUCTION

History of Digital computers, types of computers, block diagram of a digital computers, various parts of a digital computer. Computer programming — Machine language, assembly language and high-level language programming.

UNIT – II

NUMBER SYSTEMS

Binary, Octal, Decimal and Hexadecimal number systems, conversion of numbers from one system to other system, Fixed point and floating-point representation of numbers, Addition and Subtraction, Multiplication Algorithms, Division Algorithms, Floating - point Arithmetic Operations

UNIT – III

MEMORY AND PERIPHERALS

Memories: Need for memory, Types of computer memories — magnetic, Dynamic and static memories, RAM, ROM, EPROM and EEPROM memories, Cache memory, Concept of Virtual memory. Peripheral Devices: Working of Keyboard and Mouse. Types of Printers and it's working. I/O Ports, Addressing I/o devices — programmed I/O, interrupt I/O, DMA.

UNIT – IV

COMPUTER ORGANISATION

Organization of a processor - Registers, ALU and Control unit, Register transfer language, micro operations, Instruction codes, Computer instructions, Instruction formats, Instruction cycle, Memory Reference Instructions, Input — Output instructions, Control memory, Address sequencing, Design of control unit-micro programmed control, hard wired control.

UNIT – V

APPLICATIONS

Various applications of Computers, Networking of Computers, LAN, WAN, MAN, Internet. Internet of Things (loT) applications to electrical engineering.

TEXT BOOKS:

1. Computer Fundamentals By PK Sinha, 6th Edition, BPB publications.
2. Fundamentals of Computers by E. Balagurusamy, McGrawHill edition.
3. Computer Fundamentals by Anitha Goel, Pearson education

Course Outcomes:

CO1: Understand the functioning and programming of computers.

CO2: Convert numbers from one type of system to other type of system.

CO3: Distinguish between different types of memories and learn the mapping of I/O devices.

CO4: Understand the functioning of peripheral devices and addressing I/o devices.

CO5: Demonstrate the internal organization of digital computer.

CO6: Apply digital computers for storing electrical engineering problems.

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I Year - I Semester	Course Code : UR19HML101	L	T	P	C
		0	0	2	1

Internal: 20 Marks External: 30 Marks

COMMUNICATIVE ENGLISH LAB

(Common to all branches)

Course Objectives:

To enable the students to learn through practice the communication skills of listening, speaking, reading and writing.

List of Activities

1) Introducing yourself
2) Greeting
3) Thanking and Responding to thanks
4) Requesting and Responding to requests
5) Making and Responding to complaints
6) Apologising and accepting apologies
7) Consonants : Plosives, Affricates and Nasals
8) Consonants: Fricatives, Liquids and Glides
9) Vowels: Pure vowels
10) Vowels: Dipthongs
11) Consonant clusters
12) Word Accent
13) Word Stress
14) Intonation

Note: Minimum 12 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations. In case if the student fails to get eligibility for semester end exams in the current semester, he has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted.

Reference Manuals:

'INTERACT: English Lab Manual for Undergraduate Students' Published by Orient Blackswan Pvt Ltd ‘Strengthen Your Communication Skills’ published by Maruthi Publications

Course Outcomes:

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

CO1 Apply expressions in day to day life

CO2 Build language proficiency by using patterns

CO3 Develop communication skills through various language activities

CO4 Outline of Letters and Sounds

CO5 Identify consonants and vowel sounds in phonetic script

CO6 Understand pronunciation, stress and intonation

*****

I Year - I Semester	Course Code : UR19BSCL102	L	T	P	C
		0	0	3	1.5

Internal: 20 Marks External: 30 Marks

APPLIED PHYSICS LAB

Course objectives:

- To gain practical knowledge by applying the experimental methods to correlate with the Physics theory.
- To learn the usage of electrical and optical systems for various measurements.
- Apply the analytical techniques and graphical analysis to the experimental data.
- To develop intellectual communication skills and discuss the basic principles of scientific concepts in a group.

List of Experiments

1. Determination of wavelength of a source-Diffraction Grating-Normal incidence.
2. Newton's rings – Radius of Curvature of Plano - Convex Lens.
3. Determination of thickness of a spacer using wedge film and parallel interference fringes.
4. Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus.
5. Energy Band gap of a Semiconductor p - n junction.
6. Characteristics of Thermistor – Temperature Coefficients
7. Determination of dielectric constant by charging and discharging method
8. Determination of resistivity of semiconductor by Four probe method.
9. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
10. Measurement of magnetic susceptibility by Quincke's method.
11. Dispersive power of diffraction grating.
12. Verification of laws of stretched string – Sonometer.
13. Resolving power of grating.
14. Determination of Hall voltage and Hall coefficients of a given semiconductor using Hall effect.
15. Variation of dielectric constant with temperature.

Note: Minimum 12 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations. In case if the student fails to get eligibility for semester end exams in the current semester, he has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted.

Text book:

1. A Text book of Practical Physics, Balasubramanian S, Srinivasan M.N, S Chand Publishers, 2017

Course outcomes:

CO1: Handle optical instruments like microscope and spectrometer
CO2: Determine thickness of a hair/paper with the concept of interference
CO3: Estimate the wavelength and resolving power of different colors using diffraction grating
CO4: Demonstrate the elastic response of loaded beams; estimate the frequency of a vibrating system using standing wave pattern.
CO5: Estimate the strength of the magnetic field due to a current carrying coil.
CO6: Estimate the mechanical properties of materials.

*****

I Year - I Semester	Course Code : UR19ESCL101	L	T	P	C
		0	0	3	1.5

Internal: 20 Marks External: 30 Marks

ENGINEERNG WORK SHOP AND IT WORK SHOP

ENGINEERNG WORK SHOP:

Course Objectives:

- To familiarize with the basics of tools and equipments used in fitting, carpentry, Sheet metal and smithy.
- To familiarize with the production of simple modes in the above trades.

NOTE: At least one exercise to be done from each trade.

Trade: Carpentry:

1. Cross –Lap joint
2. Mortise and Tenon joint
3. T-Lap joint

FITTING:

1. V-fit
2. Square fit
3. Dovetail fit

Black Smithy:

1. S-Hook
2. Round rod to square
3. Round rod to Hexagonal headed bolt
4. Making simple parts like chisel.

House Wiring:

1. Parallel/Series connection of three bulbs
2. Stair Case wiring
3. Florescent lamp fitting
4. Measurement of earth resistance

Tin Smithy:

1. Making rectangular tray
2. Making scoop
3. Making hopper
4. Making funnel

IT WORK SHOP:

Course Objectives:

- IT Workshop is to impart basic computer usage and maintenance skills and to introduce you to a suite of productivity tools that will aid in your day to day activities.
- IT workshop works in a learning-by-doing mode. It concentrates more on hands-on experience for the participants rather theoretical classes.
- It enables the participant to make the best use of Microsoft Office Suite in their day-to-day requirements and make use of it to improve the standards in the educational environment.
- The IT Workshop prepares the participant to have a hands-on experience in maintaining and troubleshooting a PC by themselves.

Task1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your

instructor

Task2: Every student should individually install MS windows on the personal computer.

Task3: Hardware Troubleshooting: Students have to be given a PC which does not boot due to improper assembly or defective peripherals.

Task 4: Word Orientation: an overview of Microsoft (MS) office 2007/ 10: Importance of MS office 2007/10, overview of toolbars, saving files, Using help and resources, rulers, format painter.

Task 5: Excel Orientation: The importance of MS office 2007/10 tool Excel as a Spreadsheet tool, Accessing, overview of toolbars, saving excel files, Using help and resources. Creating a Scheduler - Features to be covered:- Gridlines, Format Cells, Summation, auto fill, Formatting Text.

Task 6: Basic power point utilities and tools which helpful to create basic power point presentation. Topic covered during this includes PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in both Latex and Power point.

Task 7: Introduction to HTML &Basic syntax of html Attributes, elements, lists, and basic programs, Homepage using HTML Consisting of photo, name, address and education details as a table.

Note: Minimum 12 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations. In case if the student fails to get eligibility for semester end exams in the current semester, he has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted.

Course Outcomes:

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

CO1: Identify the peripherals, components of CPU along with the functions of CPU.

CO2: Implement the installation of Windows OS and explain about Hardware Troubleshooting.

CO3: Create HTML Homepage and use MS Office like Word, Excel and Power Point Presentation.

CO4: Apply basic Electrical Engineering knowledge for House-wiring Practice.

CO5: Make different components using Fitting and Carpentry.

CO6: Prepare simple jobs as per specifications using Tinsmithy tools and Blacksmithy Tools.

*****

I Year - I Semester	Course Code : UR19MC202	L	T	P	C
		0	0	0	0

Internal: 20 Marks External: 0 Marks
Semester-end: 30 Marks

APPLIED PHYSICS - VIRTUAL LAB

(Any 3 of the following listed 12 experiments)

Course objectives:

- To gain practical knowledge by applying the experimental methods to correlate with the Physics theory.
- To learn the usage of electrical and optical systems for various measurements.

LIST OF EXPERIMENTS

1. Hall Effect
2. Crystal Structure
3. Brewster's angle
4. Numerical Aperture of Optical fiber
5. Photoelectric Effect
6. LASER – Beam Divergence and Spot size
7. Michelson's interferometer
8. Black body radiation
9. Flywheel –moment of inertia
10. AC Sonometer
11. Resistivity by four probe method
12. Newton's rings –Refractive index of liquid

URL: www.vlab.co.in

Course outcomes:

CO1: Handle optical instruments like microscope and spectrometer
CO2: Determine thickness of a hair/paper with the concept of interference

*****

I Year - II Semester	Course Code : UR19HM202	L	T	P	C
		2	0	0	2

Internal: 30 Marks External: 70 Marks

PROFESSIONAL ENGLISH

(Common to all branches)

Course Objectives:

- Recall and improve the language proficiency of the students inEnglish
- Paraphrase and interpret the ideas and thoughts in a dynamicway
- Prioritize the importance of practical learning ofEnglish
- Distinguish the various levels of Listening, Speaking, Reading and writingskills
- Construct statements in writing and speaking in professionalmanner

UNIT – I

Poem: "Enterprise" by

Nissim Ezekiel **Grammar:**

Types of Sentences

Vocabulary: Synonyms

Writing: Essay Writing

Life-Skills: Values and Ethics

UNIT – II

Text: Like a tree, unbowed:

WangariMaathai**Grammar:** Active Voice

& Passive Voice **Vocabulary:** Antonyms

Writing: Technical Report Writing **Life-Skills:** Time Management

UNIT – III

Text: Stay Hungry – Stay Foolish

Grammar: Common Errors in Articles and Prepositions

Vocabulary: Words Often Confused

Writing: Describing People, Places, Objects, Events

Life-Skills: Motivation

UNIT – IV

Story: The Cop and the Anthem by O. Henry

Grammar: Common Errors in Subject – Verb agreement

Vocabulary: Technical Vocabulary

Writing: Note- Making **Life-Skills:** Rapid Reading

UNIT – V

Short Story: "A Village School Master" by Oliver Gold Smith

Grammar: CommonErrors

Vocabulary: GRE WordList

Writing: Precise Writing / Information Article

Life-Skills: Career Planning

TEXT BOOK:

1. 'InfoTech English' – MarutiPublications

REFERENCE BOOKS:

1. Raymond Murphy, "Murphy's Essential English Grammar" with CD, Cambridge UniversityPress.
2. Practical English Usage, Michael Swan, OUP,1995
3. Remedial English Grammar, F.T. Wood, Macmillan,2007

Course Outcomes:

Upon completion of the course, the students will be able to

CO1: Apply critical thinking to develop writing skills
CO2: Evaluate common errors in grammar
CO3: Describe distinct literary characteristics of poems
CO4: Analyze the characteristics of one-act-plays
CO5: Develop correspondence skills and promotional writing skills
CO6: Evaluate the importance of values and ethics for career planning.

*****

I Year - II Semester Course Code : UR19BSC205

L	T	P	C
3	0	0	3

Internal: 30 Marks External: 70 Marks

DIFFERENTIAL EQUATIONS & VECTOR CALCULUS

(Common to all branches)

Course Objectives:

- To enlighten the learners in the concept of differential equations.
- To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications.

UNIT – I

Linear Differential Equations of Higher Order: Definitions, complete solution, operator D, rules for finding complimentary function, inverse operator, rules for finding particular integral with RHS of the forms e^ax, Sinax, Cosax, x^n, e^ax.V and xV. L-C-R Circuit problems.

UNIT – II

First order Partial Differential Equations: Formation of PDE, solutions of Lagrane's linear equation Method of grouping – Method of multipliers, Solution of non-linear PDEs of the forms f(p,q)=0, f(z,p,q)=0, f(x,p)=g(y,q), Z=px+qy+f(p,q).

UNIT – III

Applications of Partial Differential Equations: Method of Separation of variables-One dimensional Wave equation-Two dimensional Heat equation, Laplaceequation.

UNIT – IV

Vector Differential Calculus: Scalar and vector point functions, Gradient, Directional derivative. Divergence, Curl, Physical interpretation of operators.

UNIT – V

Vector Integral Calculus: Line integral-work done, surface and volume integrals, Green's theorem in the plane (without proof), Stoke's theorem (without proof), Divergence theorem (without proof).

TEXT BOOK:

1. Higher Engineering Mathematics, B. S. Grewal.

REFERENCE BOOKS:

1. Advance Engineering in Mathematics, ErwinKreyszig.
2. Vector calculus, Schaum'sseries.

Course Outcomes:

Upon completion of the course, the students will be able to

CO1: Solve the differential equations related to various engineering fields.
CO2: Identify solution methods for partial differential equations that model physical processes.
CO3: Apply a range of techniques to find solutions of standard PDEs .
CO4: Classify the nature of the partial differential equations.
CO5: Interpret the physical meaning of different operators such as gradient, curl and divergence.
CO6: Estimate the work done against a field and circulation using vector calculus.

*****

I Year - II Semester	Course Code : UR19BSC203	L	T	P	C
		3	0	0	3

Internal: 30 Marks External: 70 Marks

NUMERICAL METHODS&TRANSFORMS

(ECE/EEE)

Course Objectives:

- To elucidate the different numerical methods to solve nonlinear algebraic equations.
- To familiarize the students with numerical methods of solving the non-linear equations.
- To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications.

UNIT – I

Solution to algebraic equations: Solution of polynomial and transcendental equations: Bisection method, Regula-Falsi method, Iteration method,Newton-Raphson method.

UNIT – II

Interpolation: Finite differences, interpolation using Newton's forward and backward difference formulae, Gauss forward and backward interpolation formulae, Interpolation with unequal intervals, Newton's divided difference and Lagrange's formulae.

UNIT – III

Numerical integration and Solution of ODE: Numerical integration- trapezoidal rule and Simpson's 1/3rd and 3/8 rules. Ordinary differential equations, Taylor's series, Euler and modifiedEuler's methods. Runge-Kutta method of fourth order for solving first orderODE .

UNIT – IV

Laplace Transforms : Laplace transforms of elementary functions, Properties of Laplace Transforms of derivatives and integrals, Multiplication by t, Division by t, Inverse transforms, Method of Partial fractions, Applications of Ordinary differential equations.

UNIT – V

Fourier Transforms: Fourier integral theorem (without proof),Fourier sine and cosine integral, Fourier transforms, Fourier sine and cosine transforms, Properties of Fourier transforms.

TEXT BOOK:

Higher Engineering Mathematics, B.S. Grewal.

REFERENCE BOOKS:

1. Advanced Engineering Mathematics, Erwin kreyszig,
2. Introductory methods of Numerical Analysis by S.S.Sastri

NPTEL ONLINE COURSE:

Course Outcomes:

Upon completion of the course, the students will be able to

CO1: Evaluate approximating the roots of polynomial and transcendental equations by different Algorithms.

CO2: Apply Newton's forward & backward interpolation and Lagrange's formulae for equal and unequal Intervals.

CO3: Apply definite integral of a function by using different numerical methods.
CO4: Solve different algorithms for approximating the solutions of ordinary differential equations to itsanalytical computations.
CO5: Explain the Laplace and Inverse Laplace Transform for different types of functions and
Evaluate ordinary differential equations using Laplace transform technique.
CO6: Apply integral expressions for the forwards and inverse Fourier transform
to a range of non – periodic waveforms .

*****

I Year - II Semester Course Code : UR19BSC210

L	T	P	C
3	0	0	3

Internal: 30 Marks External: 70 Marks

APPLIED CHEMISTRY

(EEE & ECE)

Course Objectives:

- Importance of usage of Plastics in household appliances and composites (FRP) in aerospace automotive industries.
- Select the fuels as a source of energy are a basic need of any industry, particularly industries like thermalpower stations, steel industry, fertilizer industry etc., and hence they are introduced.
- Constructions of galvanic cells as well as some batteries used in instruments are introduced. Understand the mechanism of corrosion which itself is explained by electrochemical theory
- With the increase in demand, a wide variety of materials are coming up; some of them have excellent engineering properties and a few of these materials are introduced.
- Explain the computational chemistry and different applications of analytical instruments.

UNIT – I

HIGH POLYMERS AND PLASTICS

Polymerisation : Introduction- Mechanism of polymerization - Stereo regular polymers – methods of polymerization (emulsion and suspension) -Physical and mechanical properties – Plastics as engineering materials : advantages and limitations – Thermoplastics and Thermosetting plastics – Compounding and fabrication (4techniques)- Preparation, properties and applications of Polyethene, PVC, Bakelite and Teflon Elastomers – Natural rubber- compounding and vulcanization – Synthetic rubbers : Buna S, Buna N, Thiokol and polyurethanes – Applications of elastomers. Composite materials & Fiber reinforced plastics – Biodegradable polymers – Conducting polymers.

UNIT – II

FUEL TECHNOLOGY

Fuels:- Introduction – Classification – Calorific value - HCV and LCV – Dulong's formula – Bomb calorimeter – Numerical problems – Coal –– Proximate and ultimate analysis – Significance of the analyses – Liquid fuels – Petroleum- Refining – Cracking – Synthetic petrol –Petrol knocking – Diesel knocking - Octane and Cetane ratings – Anti-knocking agents – Power alcohol – Gaseous fuels – Natural gas. LPG and CNG – Combustion – Calculation of air for the combustion of a fuel – Flue gas analysis – Orsat apparatus – Numerical problems on combustion.

UNIT – III

ELECTROCHEMICAL CELLS AND CORROSION

Part-A:

ELECTROCHEMISTRY

Introduction- Galvanic cells - Reversible and irreversible cells – Single electrode potential – Electro chemical series and uses of this series- Standard electrodes (Hydrogen and Calomel electrodes) - Concentration Cells – Batteries: Dry Cell –Lead-Acid storage cells-Li cells. Fuel cells: - Hydrogen Oxygen fuel cells – Methanol Oxygen fuel cells.

Part-B

CORROSION

Corrosion:- Definition – Theories of Corrosion (electrochemical and chemical)-Galvanic corrosion,Differential aeration corrosion –Factors which influence the rate of corrosion - Protection from corrosion– Cathodic protection - Protective coatings: – Surface preparation – Metallic (cathodic and anodic) coatings - Methods of application on metals (Galvanizing, Tinning, Electroplating, Electroless plating).

UNIT – IV

CHEMISTRY OF ADVANCED ENGINEERING MATERIALS

Nano materials:- Introduction–Sol-gel method & chemical reduction method of preparation - Carbon nano tubes-Preparation and Applications;**Solar Energy:**- Introduction, application of solar energy, photovoltaic cell: design, working and its importance **Liquid Crystals** :- Types and applications **Non-Elemental Semiconducting Materials:-**Stoichiometric, Controlled valency&Chalcogen photo/semiconductors, Preparation of Semiconductors(Distillation,Zonerefining,Czochralski crystal pulling,epitaxy,diffusion,ion implantation) **Superconductors** :- Type-I & Type-2, properties &applications.

UNIT – V

COMPUTATIONAL CHEMISTRY AND SPECTROSCOPIC STUDIES

COMPUTATIONAL CHEMISTRY: Introduction,Ab Initio studies.

SPECTROSCOPIC STUDIES: Electromagnetic spectrum-UV(laws of absorption,instrumentation,theory of electronic spectroscopy,Frank-condon principle,chromophores and auxochromes,intensity shifts,applications),X-Ray diffraction method , FT-IR(Instrumentation and IR of some organic compounds,applications)-MRI and CT scan(Procedure & Applications).

TEXT BOOKS:

1.Engineering Chemistry by Jain and Jain; DhanpatRaiPublicating Co.
2. Engineering Chemistry by ShikhaAgarwal; Cambridge University Press, 2015 edition.

REFERENCE BOOKS:

1.Engineering Chemistry of Wiley India Pvt. Ltd., Vairam and others, 2014 edition (second).
2. Engineering Chemistry by PrasanthRath, Cengage Learning, 2015 edition.
3. A text book of engineering Chemistry by S. S. Dara; S. Chand & Co Ltd., Latest Edition
4. Applied Chemistry by H.D. Gesser, Springer Publishers
5. Text book of Nano-science and nanotechnology by B.S. Murthy, P. Shankar and others, University Press, IIM.

Course Outcomes:

Upon completion of this course, the students will be able to

CO1: Understand the advantages and limitations of plastic materials.
CO2: Describe the need of fuels as a source of energy.
CO3: Explain the theory of construction of batteries.
CO4: Study some methods of corrosion control and Categorize the reasons for corrosion.
CO5: Generalize the importance of advanced engineering materials like Nanomaterials, Liquid Crystals, Principles of Green chemistry, Refractories and Cementing materials.

CO6: Obtainthe knowledge of computational chemistry and understand the principles of different analytical instruments.

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I Year - II Semester	Course Code : UR19ESC202	L	T	P	C
		3	0	0	3

Internal: 30 Marks External: 70 Marks

ELECTRICAL CIRCUIT ANALYSIS-I

(EEE)

Course Objectives:

- To study the concepts of passive elements, types of sources and various network reduction techniques.
- To understand the applications of network topology to electrical circuits.
- To study the concept of magnetic coupled circuit.
- To understand the behavior of RLC networks for sinusoidal excitations.
- To study the performance of R-L, R-C and R-L-C circuits with variation of one of the parameters and to understand the concept of resonance.
- To understand the applications of network theorems for analysis of electrical networks.

UNIT – I

Introduction to Electrical Circuits: Passive components and their V-I relations. Sources (dependent and independent) -Kirchoff's laws, Network reduction techniques. source transformation technique, nodal analysis and mesh analysis..

UNIT – II

Network topology: Definitions of Graph and Tree, Basic cutset and tieset matrices for planar networks, Loop and nodal methods of analysis of networks with independent voltage and current sources, Duality and Dual networks.

UNIT – III

Magnetic Circuits: Basic definition of MMF, flux and reluctance. Analogy between electrical and magnetic circuits.Faraday's laws of electromagnetic induction Concept of self and mutual inductance. Dot convention-coefficient of coupling

Single Phase A.C Systems: Periodic waveforms -Concept of phase angle and phase difference – Waveforms and phasor diagrams for lagging, leading networks. Complex and polar forms of representations, steady state analysis of R, L and C circuits. Power Factor and its significance real, reactive power and apparent power, waveform of instantaneous power triangle and complex power.

UNIT – IV

Analysis of AC Networks: Extension of node and mesh analysis to AC networks, Numerical problems on sinusoidal steady state analysis, Series and parallel resonance, selectively band width and Quasi factor.

UNIT – V

Network theorems (DC & AC Excitations): Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum Power Transfer theorem, Reciprocity theorem, Millman'stheorem .

TEXT BOOK:

1. Engineering Circuit Analysis by William Hayt and Jack E.Kemmerley,McGraw Hill Company,6 th edition
2. Network Analysis: Van Valkenburg; Prentice-Hall of India Private Ltd

REFERENCE BOOKS:

1. Fundamentals of Electrical Circuits by Charles K.Alexander and Mathew N.O.Sadiku, McGraw Hill Education (India)
2. Electric Circuits by David A. Bell, Oxford publications
3. Introductory Circuit Analysis by Robert L Boylestad, Pearson Publications
4. Circuit Theory (Analysis and Synthesis) by A.Chakrabarthi,DhanpatRai&Co.

NPTEL ONLINE COURSE:

Course Outcomes:

Upon completion of the course, the students will be able to

CO1: Design various electrical networks in presence of active and passive elements.
CO2: Express electrical networks with network topology concepts.
CO3: Judge any magnetic circuit with various dot conventions.
CO4: Identify any R, L, C network with sinusoidal excitation.
CO5: Memorize any R, L, network with variation of any one of the parameters i.e R, L, C. and f.
CO6: Identify electrical networks by using principles of network theorems.

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I Year - II Semester	Course Code : UR19ESC210	L	T	P	C
		3	0	0	3

Internal: 30 Marks External: 70 Marks

Problem Solving and Programming Using C

(CE/EEE/ECE/CSE/IT)

Course Objectives:

- The objectives of this course are to make the student familiar with 'problem solving using computers, development of algorithms, usage of basic flowchart symbols and designing flowcharts.
- The students can also understand programming language basic concepts, reading and displaying the data, earn the programming skills using selection, iterative control structures, functions, arrays, pointers and files. After completion of this course the student is expected to analyze the real life problem and write programs in C language to solve theproblems.

UNIT – IINTRODUCTION

Problem Solving: Problem solving aspects, Problem solving techniques, Computer as a Problem solving tool, Algorithms-definition, features, criteria. Flowchart-definition, basic symbols, sample flowcharts. Top down design, Implementation of program verification, The efficiency of algorithms, Analysis of algorithms, computational complexity of algorithm, order(O) notation, Worst case & Average case Analysis.

UNIT – II

Basics of C programming language: Introduction to C, structure of a C program,.basic data types and sizes, constants, variables, unary, binary and ternary operators, expressions, type conversions, conditional expressions, precedence and order of evaluation, Input and Output statements, Sample Programs.

SELECTION-DECISION MAKING CONDITIONAL CONTROL STRUCTURES: simple-if, if- else, nested if-else, if- else ladder and switch-case.

ITERATIVE: while-loop, do-while loop and for loop control structures, goto, break and continue statements. Sample Programs.

UNIT – III

FUNCTIONS-basics, parameter passing, storage classes extern, auto, register, static, scope rules, block structure, user defined functions, standard library functions, recursive functions, Recursive solutions for Fibonacci series, towers of Hanoi, header files, C Preprocessor, example c programs :

ARRAYS-concepts, declaration, definition, accessing elements, storing 'elements, 1-D arrays, 2-D arrays and character arrays, Multidimensional arrays, array applications: Matrix operations, checking the symmetricity of a Matrix, Passing 1-D arrays, 2-D arrays to functions, Strings and String Manipulations

UNIT – IV

POINTERS-pointers concepts, initialization of pointer variables, pointers and function

arguments, passing by address-dangling memory, address arithmetic, character pointers and functions, pointers to pointers, pointers and -multi-dimensional arrays, dynamic memory management functions, command line arguments

UNIT – V

ENUMERATED, STRUCTURE AND UNION TYPES: Derived types- structures- declaration, definition and initialization of structures, accessing 'structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bit-fields, program applications

FILEHANDLING: Concept of a file, text files and binary files, Formatted I/O, File I/O operations

TEXT BOOKS:

1. How to Solve it by Computer, R. G. Dromey, Pearson Education,2019
2. ProgramminginC,AshokNKamthane,AmitAshokKamthane,3rdEdition,PearsonEducation, 2019

Reference Books:

1. The C programming Language by Dennis Richie and BrianKernighan
2. Programming in C, ReemaThareja,OXFORD
3. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad,Cengage

Course Outcomes:

Upon completion of the course, the students will be able to

CO1: Design efficient algorithm for solving a problem.
CO2: Identify various constructs of C programming language efficiently.
CO3: Apply programs using modular approach such as functions.
CO4: Create programs to perform matrix and mathematical applications.
CO5: Understand dynamic memory management and problems using pointers and solving the problems.
CO6: Developreal life applications using structures and also learn about handling the files for storing the data permanently.

*****

I Year - II Semester	Course Code : UR19HML202	L	T	P	C
		0	0	3	1.5

Internal: 20 Marks External: 30 Marks

PROFESSIONAL ENGLISH LAB

(Common to all branches)

Course Objectives:

To enable the students to learn through practice the communication skills of listening, speaking, reading and writing.

List of activities:

1) Body Language: facial expressions, body posture, gestures
2) Body Language: eye movement, touch and the use of space
3) JAM
4) Extempore
5) Debate: Lincoln-Douglas debate and dos and don'ts
6) Debate: Formal and Informal debate
7) Interview Skills: Formal and Informal Interview
8) Interview Skills: Telephonic interview
9) Group Discussion: Dos and don'ts, general topics
10) Group Discussion: Science and technical topics
11) Presentation: Elimination of stage fear and preparation
12) Presentation on general topics
13) Presentation: using ppt or visual aids.

Note: Minimum 12 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations. In case if the student fails to get eligibility for semester end exams in the current semester, he has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted.

Reference Manuals:

'INTERACT: English Lab Manual for Undergraduate Students' Published by Orient Blackswan Pvt Ltd 'Strengthen Your Communication Skills' published by Maruthi Publications

Course Outcomes:

Upon Completion of the course, the student will be able to:

CO1 Understand different types of body language
CO2 Develop communication skills through various language activities
CO3 Apply critical thinking to get main ideas for debate
CO4 Develop audacity to face an interview
CO5 Build knowledge for discussing topics effectively
CO6 Analyze a topic by making a presentation

*****

I Year - II Semester	Course Code : UR19BSCL203	L	T	P	C
		0	0	3	1.5

Internal: 20 Marks External: 30 Marks

Engineering and Applied Chemistry Lab

Course objectives:

- To gain practical knowledge by applying the experimental methods to correlate with the chemistry theory.
- To learn the usage of electrical systems for various measurements.
- Apply the analytical techniques and graphical analysis to the experimental data.

List of Experiments

1. Introduction to Chemistry laboratory-Molarity,Normality,Primary,Secondary standard solutions, Volumetric titrations, Qualitative analysis, Quantitative analysis etc.
2. Trial experiment-Estimation of HCl by using standard Na_2CO_3 solution.
3. Estimation of Total hardness of water by using standard EDTA solution.
4. Estimation of Zinc using standard EDTA solution.
5. Estimation of Copper using standard EDTA solution.
6. Estimation of P^H of the given sample solution using P^H meter.
7. Conductometric titration between Strong acid and Strong base.
8. Conductometric titration between Strong acid and Weak base.
9. Potentiometric titration between Strong acid and Strong base.
10. Potentiometric titration between Strong acid and Weak base.
11. Estimation of $KMnO_4$ using standard Oxalic acid.
12. Determination of Alkalinity of water.
13. Determination of Viscosity of given sample by Ostwald viscometer.
14. Estimation of Ferric iron using standard $K_2Cr_2O_7$ solution.
15. Estimation of Copper using standard $K_2Cr_2O_7$ solution.
16. Preparation of Bakelite (Demo).

Note: Minimum 12 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations. In case if the student fails to get eligibility for semester end exams in the current semester, he has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted.

Course Outcomes:

Upon Completion of the course, the student will be able to

CO1: Utilize different Analytical tools and execute experiments involving estimation of raw materials, finished products and environmental samples etc.

CO2: Utilize modern instruments like Conductometer, pH meter and Potentiometer for the analysis of samples.

CO3: Determine the total hardness present in water for its quality in drinking purpose.

CO4: Estimate the Viscosity of oil and assess its suitability as a lubricant.

CO5: Determine the alkalinity present in water for its quality in drinking purpose.

CO6: Identify the adulteration of lemon juice for Vitamin-C.

Reference Books

1. A Textbook of Quantitative Analysis, Arthur J. Vogel.
2. Dr. Jyotsna Cherukuris (2012) Laboratory Manual of engineering chemistry-II, VGS Techno Series
3. Chemistry Practical Manual, Lorven Publications
4. K. Mukkanti (2009) Practical Engineering Chemistry, B.S. Publication.

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I Year - II Semester	Course Code : UR19ESCL202	L	T	P	C
		0	0	3	1.5

Internal: 20 Marks External: 30 Marks

Problem Solving and Programming using C Lab

Course Objectives:

- Understand the basic concept of C Programming, and its different modules that include conditional and looping expressions, Arrays, Strings, Functions, Pointers, Structures and File programming.
- Acquire knowledge about the basic concept of writing a program.
- Role of constants, variables, identifiers, operators, type conversion and other building blocks of C Language.
- Use of conditional expressions and looping statements to solve problems associated with conditions and repetitions.
- Role of Functions involving the idea of modularity.

Exercise 1

a) Write a C Program to calculate the area of a triangle.
b) Write a C program to find the largest of three numbers using ternary operator.
c) Write a C Program to swap two numbers without using a temporary variable.

Exercise 2

a) Write a C program to find the 2's complement of a binary number.
b) Write a C program to find the roots of a quadratic equation.
c) Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)

Exercise 3

a) Write a C program to find the sum of individual digits of a positive integer and, also, find 'the reverse of the given number.
b) Write a C program to generate the first n terms of the Fibonacci sequence.
c) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

Exercise 4

a) Write a C Program to print the multiplication table of a given number.
b) Write a C Program to read a decimal number and find its equivalent binary number.
c) Write a C Program to check whether the given number is Armstrong number or not.

Exercise 5

a) Write a C program to interchange the largest and smallest numbers in the given array.
b) Write a C program to implement a liner search on a given set of values.
c) Write a C program to implement binary search on a given set of values.

Exercise 6

a) Write a C program to implement sorting of an array of elements.
b) Write a C program to input two m x n matrices, check the compatibility and perform 'addition and multiplication of them.

Exercise 7

Write a C program that uses functions to perform the following operations:

i. To insert a sub-string into given main string at a given position.
ii. To delete n characters from a given position in a given string.
iii. To replace a character of string either from beginning or ending or at a specified location.

Exercise 8

Write a C program that uses functions to perform the following operations using Structure:

i) Reading a complex number
ii) Writing a complex number
iii) Addition of two complex numbers
iv) Multiplication of two complex numbers

Exercise 9

Write C Programs for the following string operations without using the built in functions

- to concatenate two strings to append a string to another string
- to compare two strings

Exercise 10

a) Write C Program to find the number of characters in a given string including and excluding spaces.
b) Write C Program to copy the contents of one string to another string without using string handling functions.
c) Write C Program to find whether a given string is palindrome or not.
d) Write a C program to find both the largest and smallest number of an array of integers using call by value and call by reference.

Exercise 11

Write a C program using recursion for the following:

a) To display sum of digits of given number
b) To find the factorial of a given integer
c) To find the GCD (greatest common divisor) of two given integers.
d) To find Fibonacci sequence

Exercise 12

a) Write C Program to reverse a string using pointers
b) Write a C Program to compare two 2D arrays using pojnters
c) Write a C program consisting of Pointer based function to exchange value of two integers using passing by address.

Exercise 13

Examples which explores the use of structures, union and other user defined variables.

Exercise 14

a) Write a C program. which copies one file to another.
b) Write a C program to count the number of characters and number of lines in a file.
c) Write a C Program to merge two files into a third file. The names of the files must be entered using command line arguments.

Note: Minimum 12 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations. In case if the student fails to get eligibility for semester end exams in the current semester, he has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted.

Course Outcomes:

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

CO1: Apply and practice logical ability to solve the problems.

CO2: Identify C programming development environment, compiling, debugging, and linking and executing a program using the development environment.

CO3: Analyze the complexity of problems, modularize the problems into small modules and then convert them into programs.

CO4: Apply the in-built functions and customized functions for solving the problems.

CO5: Create C programs using pointers, memory allocation techniques.

CO6: Use files for dealing with variety of problems.

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I Year - II Semester Course Code : UR19MC200

L	T	P	C
0	0	0	0

Internal: 20 Marks External: 0 Marks

Semester-end: 30 Marks

ENGINEERING EXPLORATION PROJECT

COURSE OBJECTIVES:

- Build mindsets & foundations essential for designers
- Learn about the Human-Centered Design methodology and understand their real-world applications
- Use Design Thinking for problem solving methodology for investigating illdefined problems.
- Undergo several design challenges and work towards the final design challenge.

Apply Design thinking on the following Streams to

- Project Stream 1: Electronics, Robotics, IOT and Sensors
- Project Stream 2: Computer Science and IT Applications
- Project Stream 3: Mechanical and Electrical tools
- Project Stream4: Eco-friendly solutions for waste management, infrastructure, safety, alternative energy sources, Agriculture, Environmental science and other fields of engineering.

HOW TO PURSUE THE PROJECT WORK?

- The first part will be learning-based-masking students to embrace the methodology by exploring all the phases of design thinking through the wallet/ bag challenge and podcasts.
- The second part will be more discussion-based and will focus on building some necessary skills as designers and learning about complementary material for human-centered design.
- The class will then divide into teams and they will be working with one another for about 2 – 3 weeks. These teams and design challenges will be the basis for the final project and final presentation to be presented.
- The teams start with **Design Challenge** and go through all the phases more in depth from coming up with the right question to empathizing to ideating to prototyping and to testing.
- Outside of class, students will also be gathering the requirements, identifying the challenges, usability, importance etc
- At the end, Students are required to submit the final reports, and will be evaluated by the faculty.

TASKS TO BE DONE:

Task 1: Everyone is a Designer

- Understand class objectives & harness the designer mindset

Task 2: The Wallet/Bag Challenge and Podcast

- Gain a quick introduction to the design thinking methodology
- Go through all stages of the methodology through a simple design challenge
- Podcast: Observe, Listen and Engage with the surrounding environment and identify a design challenge.

Task 3: Teams & Problems

- Start Design Challenge and learn about teams & problems through this
- Foster team collaboration, find inspiration from the environment and learn how to identify problems.

Task 4: Empathizing

- Continue Design Challenge and learn empathy
- Learn techniques on how to empathize with users
- Go to the field and interview people in their environments
- Submit Activity Card

Task 5: Ideating

- Continue Design Challenge and learn how to brainstorm effectively
- Encourage exploration and foster spaces for brainstorming
- Submit Activity Card

Task 6: Prototyping

- Continue Design Challenge and learn how to create effective prototypes
- Build tangible models and use them as communication tools
- Start giving constructive feedback to classmates and teammates
- Submit Activity Card

Task 7: Testing

- Finish Design Challenge and iterate prototypes and ideas through user feedback
- Evolve ideas and prototypes through user feedback and constructive criticism
- Get peer feedback on individual and group performance
- Submit Activity Card

Task 8:

- Final Report Submission and Presentation

Note: The colleges may arrange for Guest Speakers from Various Design Fields: Graphic Design, Industrial Design, Architecture, Product Design, Organizational Design, etc to enrich the students with Design Thinking Concept.

REFERENCES:

1. Tom Kelly, *The Art of Innovation: Lessons in Creativity From IDEO, America's Leading Design Firm* (Profile Books, 2002)

2. Tim Brown, Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation (HarperBusiness, 2009)

3. Jeanne Liedtka, Randy Salzman, and Daisy Azer, Design Thinking for the Greater Good: Innovation in the Social Sector (Columbia Business School Publishing, 2017)

OTHER USEFUL DESIGN THINKING FRAMEWORKS AND METHODOLOGIES:

- Human-Centered Design Toolkit (IDEO); https://www.ideo.com/post/design-kit
- Design Thinking Boot Camp Bootleg (Stanford D-School); https://dschool.stanford.edu/resources/the-bootcamp-bootleg
- Collective Action Toolkit (frogdesign); https://www.frogdesign.com/wpcontent/uploads/2016/03/CAT_2.0_English.pdf
- Design Thinking for Educators (IDEO); https://designthinkingforeducators.com/

I Year - II Semester	Course Code : UR19MC203	L	T	P	C
		0	0	0	0

Internal: 100 Marks External: 0 Marks

CONSTITUTION OF INDIA

(CE,EEE, ME & ECE)

Course Objectives:

- To Enable the student to understand the importance ofconstitution
- To understand the structure of executive, legislature andjudiciary
- To understand philosophy of fundamental rights andduties
- To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of india and election commission ofindia.
- To understand the central and state relation financial andadministrative.

UNIT – I

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

UNIT – II

Union Government and its Administration Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and CentralSecretariat,LokSabha,RajyaSabha,TheSupremeCourtandHighCourt:PowersandFunctions;

UNIT – III

State Government and its Administration Governor - Role and Position -CM and Council of ministers, State Secretariat: Organisation, Structure and Functions

UNIT – IV

A.Local Administration - District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation PachayatiRaj: Functions PRI: Zila Panchayat, Elected officials and their roles, CEO Zila Panchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy.

UNIT – V

Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate State Election Commission:, Functions of Commissions for the welfare of SC/ST/OBC and women.

TEXT BOOKS:

1.Subash Kashyap, Indian Constitution, National Book Trust
2.J.A. Siwach, Dynamics of Indian Government & Politics

REFERENCE BOOKS:

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd.. New Delhi
2.D.C. Gupta, Indian Government and Politics
3.H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)

4.J.C. Johari, Indian Government and Politics Hans
5.J. Raj Indian Government and Politics
6.M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice –
Hall of India Pvt. Ltd.. New Delhi
7.Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil
Right), Challenges to Civil Rights Guarantees in India, Oxford University Press2012.

NPTEL ONLINE COURSE:

Course Outcomes:

Upon completion of the course, the students will be able to

CO1: Explain the concept of Indian constitution and Evaluate Preamble Fundamental Rights and Duties

CO2: Judge the structure of Indian government, Differentiate between the state and central government.

CO3: Explain the role of President and Prime Minister and Know the Structure of Supreme Court and High court.

CO4: Analyze the role Governor and Chief Minister and explain the role of state Secretariat

CO5: Explain theroleofMyerandelectedrepresentativesofMunicipalities,EvaluateZillapanchayat block levelorganization

CO6: Identify the roles of Election Commission apply knowledge and Evaluate various commissions of viz SC/ST/OBC andwomen.

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H.T.No.: | | | | | | | | | | |

USHA RAMA COLLEGE OF ENGINEERING AND TECHNOLOGY

(An Autonomous College in the jurisdiction of JNTUK, Kakinada)

I B. Tech I Semester Regular Examinations, Jan-2020

UR19HM101: COMMUNICATIVE ENGLISH

(Common to ALL Branches)

Time: 3 hours Max. Marks: 5x14 = 70

Answer either A or B from each Question. All Questions carry equal marks

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1.A. i)	What is the theme of the poem, 'Life'?	**7M** (BL2)
ii)	Write a paragraph on 'Eradication of Corruption in India'.	**7M** (BL6)
	OR	
1.B. i)	How does Sarojini Naidu depict the life of children in the poem, 'Life'?	**7M** (BL2)
ii)	What are the ways to develop positive attitude?	**7M** (BL6)
2.A. i)	What could be the reason for the drawer remaining locked for close to 25 years?	**7M** (BL2)
ii)	Write a letter to the Sub-Inspector of police of your area complaining about the loss of your purse.	**7M** (BL6)
	OR	
2.B. i)	How does the writer support her statement that the1990's had a fine balancing act in the lesson 'A Drawer full of happiness'?	**7M** (BL2)
ii)	How do you improve self management skills?	**7M** (BL6)
3.A. i)	Half a rupee worth ---Justify the title	**7M** (BL5)
ii)	Explain non-verbal communication in detail?	**7M** (BL4)
	OR	
3.B. i)	Describe Subbaiah's Character in 'Half a rupee Worth'.	**7M** (BL1)
ii)	What are the steps to be more assertive?	**7M** (BL4)
4.A. i)	Discuss Turning point with reference to Prof. Stephen Hawking's life.	**7M** (BL2)
ii)	Explain the ways of behavior in assertive people?	**7M** (BL4)
	OR	
4.B. i)	What are the greatest contributions to Science by Prof. Hawking?	**7M** (BL1)
ii)	Write a speech on "Independence Day".	**7M** (BL6)
5.A. i)	Justify the title of the poem 'Once Upon a Time'.	**7M** (BL5)
ii)	Write an email to your classmate regarding intra-college quiz competition to be held at Usha Rama College of Engineering.	**7M** (BL6)
	OR	
5.B. i)	What is the relationship between the narrator and the listener in the poem 'Once Upon a Time'?	**7M** (BL2)
ii)	What are the steps to 'Setting a Goal'?	**7M** (BL4)

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H.T.No.: | | | | | | | | | | |

USHA RAMA COLLEGE OF ENGINEERING AND TECHNOLOGY

(An Autonomous College in the jurisdiction of JNTUK, Kakinada)

I B. Tech I Semester Regular Examinations, Jan-2020

UR19BSC101: LINEAR ALGEBRA & CALCULUS

(Common to ALL Branches)

Time: 3 hours Max. Marks: 5x14 = 70

Answer either A or B from each Question. All Questions carry equal marks

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1.A. i) Solve $10x-7y+3z+5u=6,\ -6x+8y-z-4u=5,\ 3x+y+4z+11u=2,$ $5x-9y-2z+4u=7$ by Gauss elimination method. **7M** (BL3)

ii) Find the eigen values and eigen vectors of the matrix $A=\begin{bmatrix}3 & 1 & 4\\ 0 & 2 & 6\\ 0 & 0 & 5\end{bmatrix}$ **7M** (BL5)

OR

1.B. i) Show that the sum of the eigen values of a matrix is its trace. **5M** (BL2)

ii) Verify Cayley-Hamilton theorem, hence find the inverse of $A=\begin{bmatrix}3 & 2 & 4\\ 4 & 3 & 2\\ 2 & 4 & 3\end{bmatrix}$ **9M** (BL3)

2.A. i) Test for convergence of the series $\sum_{n=2}^{\infty}\frac{x^n}{n(n-1)(n-2)}$ **7M** (BL3)

ii) Discuss the convergence of $\sum\left(\frac{n}{n+1}\right)^{n^2}$ **7M** (BL3)

OR

2.B. i) Obtain the Fourier series for $f(x)=e^{-x}$ in the interval $0<x<2\pi$ **7M** (BL2)

ii) Find a Fourier series to represent x^2 in the interval $(-\pi,\pi)$ **7M** (BL2)

3.A. i) Verify Rolle's theorem for $f(x)=(x-a)^m(x-b)^n$ where m, n are positive integers. **7M** (BL3)

ii) Verify Lagrange's mean value theorem for $(x-1)(x-2)(x-3)$ in [0, 4] **7M** (BL3)

OR

3.B. i) Verify Maclaurin's theorem for $f(x)=(1-x)^{5/2}$ with lagrange's form of remainder. **7M** (BL3)

ii) Find the value of 'c' by Cauchy's mean value theorem for $Sinx$ and $Cosx$ in $(0,\pi)$ **7M** (BL3)

4.A. i) If $u=\tan^{-1}(y/x)$ where $x=e^t-e^{-t}$ and $y=e^t+e^{-t}$ find du/dt. **7M** (BL5)

ii) If $u=F(x-y,y-z,z-x)$ prove that $\frac{\partial u}{\partial x}+\frac{\partial u}{\partial y}+\frac{\partial u}{\partial z}=0$ **7M** (BL2)

OR

4.B. i) Show that $u=x\sqrt{1-y^2}+y\sqrt{1-x^2}$, $v=Sin^{-1}x+Sin^{-1}y$ are functionally related and find the relationship. **7M** (BL2)

ii) Discuss the maxima and minima of $f(x,y)=x^3y^2(1-x-y)$ **7M** (BL2)

5.A. i) Evaluate $\iint_A xydxdy$ where A is the domain bounded by x-axis, ordinate $x = 2a$ and the curve $x^2 = 4ay$. **7M** (BL5)

ii) Change of order of integration, evaluate $\int_0^{4a}\int_{x^2/4}^{2\sqrt{ax}} dydx$ **7M** (BL5)

OR

5.B. i) Evaluate $\int_{-1}^{1}\int_{0}^{z}\int_{x-z}^{x+z}(x+y+z)dxdydz$ **7M** (BL5)

ii) Find the volume bounded by the cylinder $x^2 + y^2 = 4$ and the planes $y + z = 4$ and $z = 0$. **7M** (BL4)

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H.T.No.: | | | | | | | | | | |

USHA RAMA COLLEGE OF ENGINEERING AND TECHNOLOGY

(An Autonomous College in the jurisdiction of JNTUK, Kakinada)

I B. Tech I Semester Regular Examinations, Jan-2020

UR19BSC108: APPLIED PHYSICS

(EEE & ECE)

Time: 3 hours Max. Marks: 5x14 = 70

Answer either A or B from each Question. All Questions carry equal marks

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1.A. i)	What are necessary conditions for obtaining interference of fringes?	**4M**	(BL1)
ii)	With ray diagram discuss the theory of thin films and derive the condition for constructive and destructive interference in reflected light.	**10M**	(BL2)
	OR		
1.B. i)	Explain with theory the Fraunhofer diffraction at a single slit.	**10M**	(BL2)
ii)	Calculate the possible order of spectra with a plane transmission grating having 18,000 lines per inch when light of wavelength 4500Å is used.	**4M**	(BL5)
2.A. i)	Describe Davisson and Germer's experiment in support of the existence of matter waves.	**10M**	(BL3)
ii)	Compute the de-Broglie wavelength of an electron whose kinetic energy is 10ev.	**4M**	(BL5)
	OR		
2.B. i)	State and explain Heisenberg's uncertainty principle.	**4M**	(BL2)
ii)	Obtain an expression for energy levels of an electron in a one dimensional potential well of infinite height.	**10M**	(BL5)
3.A. i)	What are the merits and demerits of classical free electron theory?	**6M**	(BL1)
ii)	Derive an expression for density of states based on quantum free electron theory.	**8M**	(BL3)
	OR		
3.B. i)	How does the band theory of solids lead to the classification of solids into conductors, Semiconductors and insulators?	**6M**	(BL1)
ii)	Explain the concept of effective mass of an electron.	**8M**	(BL2)
4.A. i)	Draw the diagram to show the variation of the Fermi level with temperature in Intrinsic Semiconductor.	**4M**	(BL3)
ii)	Derive an expression for density of charge carriers in an extrinsic n-type Semiconductor.	**10M**	(BL5)
	OR		
4.B. i)	Explain Hall Effect and derive an expression for Hall coefficient. Give any two of its Applications.	**8M**	(BL2)
ii)	Define Drift and Diffusion currents and obtain the relation between mobility and Diffusion coefficient	**6M**	(BL4)
5.A. i)	Explain the origin of magnetism in materials and derive expression for magnetic moment	**7M**	(BL2)
ii)	Draw and explain B-H curve for a ferromagnetic material placed in a magnetic field.	**7M**	(BL4)
	OR		
5.B. i)	Derive an expression for internal filed in a dielectric placed in field E	**8M**	(BL5)
ii)	Obtain Clasius- Mossotti equation	**6M**	(BL5)

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H.T.No.: | | | | | | | | | | |

USHA RAMA COLLEGE OF ENGINEERING AND TECHNOLOGY

(An Autonomous College in the jurisdiction of JNTUK, Kakinada)

I B. Tech I Semester Regular Examinations, Jan-2020

UR19ESC108: ENGINEERING GRAPHICS AND DRAFTING

(CIVIL / EEE / ECE)

Time: 3 hours Max. Marks: 5x14 = 70

Answer either A or B from each Question. All Questions carry equal marks

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1.A. i) Draw regular pentagon, hexagon and a heptagon on a common edge of side 30mm. **6M** (BL1)

ii) Construct a scale of 1:40 to read metres, decimeters and centimeters and long enough to measure up to 6 m. Mark a distance of 4.76 m on it. **8M** (BL6)

OR

1.B. i) Inscribe the largest possible ellipse in a rectangle of sides 160 mm and 100 mm. **6M** (BL2)

ii) The distance between two stations by road is 200 km and it is represented on a certain map by a 5 cm long line. Find the R.F and construct a diagonal scale showing single kilometer and long enough to measure up to 600 km. Show a distance of 467 km on this scale. **8M** (BL3)

2.A. i) Two points P and Q lying in the VP are 90 mm apart. The horizontal distance between the points is 60 mm. if the point P is 15 mm above the HP. Find the height of the point Q above the HP and the inclination of the line joining P and Q with the HP. **6M** (BL1)

ii) A 60 mm long line AB is parallel to and 20 mm in front of the VP the ends A and B of the line are 10 mm and 50 mm above the HP, respectively. Draw the projections of the line and determine its inclination with the HP. **8M** (BL5)

OR

2.B. i) A point U is 12 mm below HP, 25 mm behind VP and 38 mm away from Profile Plane. Draw front view, top view and left side view of the point. **6M** (BL1)

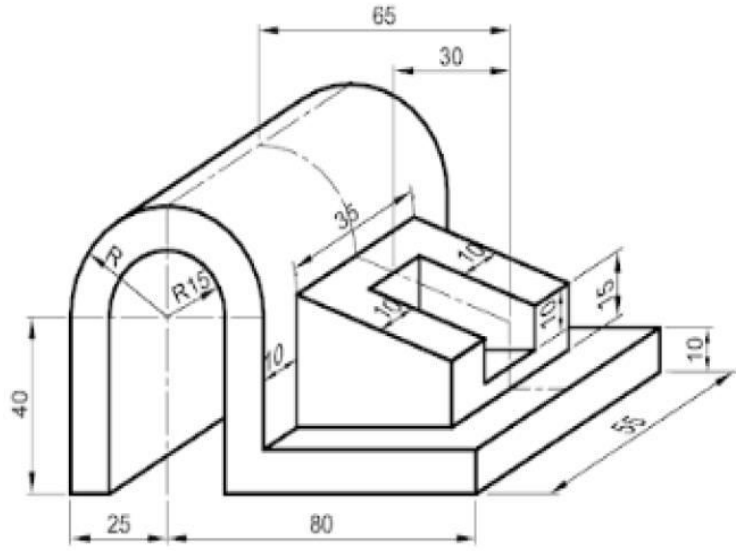
ii) An 80 mm long line PQ is inclined at 300 to the VP and is parallel to the HP. The end P of the line is 20 mm above the HP and 40 mm in front of the VP. Draw the projections of the line and determine its traces **8M** (BL5)

3.A. i) A pentagon ABCDE of side 30 mm has its side AB in the VP and inclined at 300 to the HP and the corner B is 15 mm above the HP and the corner D is 30 mm in front of the VP. Draw the projections of the plane and find its inclination with the VP. **14M** (BL1)

OR

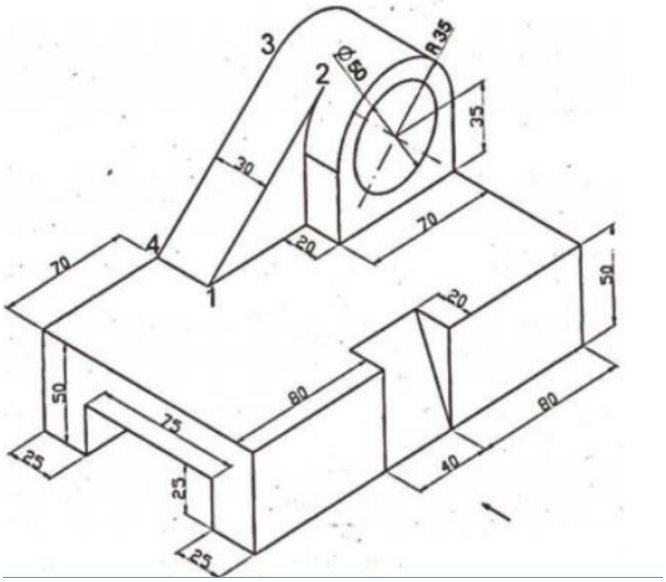
3.B. i) A pentagonal prism, of base side 30 mm and axis 70 mm is resting on one of its rectangular faces in the VP. Draw its projections **14M** (BL1)

4.A. i) The front and top views of an object are shown in figure. Draw its isometric view. **14M** (BL1)



OR

4.B. i) Convert the following isometric view in to orthographic views. All dimensions are in millimeters. **14M** (BL2)



5.A. i) State and explain various advantages & applications of computer aided drafting. **14M** (BL5)

OR

5.B. i) Describe briefly various Display commands in AUTOCAD. **14M** (BL2)

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H.T.No.: | | | | | | | | | | |

USHA RAMA COLLEGE OF ENGINEERING AND TECHNOLOGY

(An Autonomous College in the jurisdiction of JNTUK, Kakinada)

I B. Tech I Semester Regular Examinations, Jan-2020

UR19ESC109: FUNDAMENTALS OF COMPUTER SCIENCE

(Common to EEE, CSE & IT)

Time: 3 hours Max. Marks: 5x14 = 70

Answer either A or B from each Question. All Questions carry equal marks

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1.A. i)	Explain the evolution of computers. Further state how computers in one generation or better than predecessors.	**7M** (BL2)
ii)	Distinguish between the machine, Assembly and High Level language programming.	**7M** (BL4)
	OR	
1.B. i)	Explain various parts of a digital computer.	**7M** (BL2)
ii)	Explain the block diagram of a digital computer.	**7M** (BL2)
2.A. i)	How to represent the fixed and floating point numbers in number system explain with examples.	**8M** (BL1)
ii)	Change the Decimal 987654 into Octal and Hexadecimal number systems	**6M** (BL6)
	OR	
2.B. i)	Explain the algorithms in the number system with example.	**10M** (BL2)
ii)	Explain how to convert given hexadecimal number into binary number	**4M** (BL2)
3.A. i)	List the different types of memories used in computer system.	**7M** (BL4)
ii)	Explain the working of following (i) Keyboard (ii) Mouse (iii) I/O (iv) DMA	**7M** (BL2)
	OR	
3.B. i)	List the peripheral devices using in computer environment	**6M** (BL4)
ii)	Explain the briefly the following memories. (i) Cache Memory (ii) EPROM (iii) EEPROM	**8M** (BL2)
4.A. i)	Explain about control unit	**4M** (BL2)
ii)	Discuss about instruction formats	**10M** (BL6)
	OR	
4.B. i)	Discuss about ALU.	**4M** (BL6)
ii)	Explain the design of control unit – Micro programmed control and Hard wired control units	**10M** (BL2)
5.A. i)	List the various applications of the computers and explain	**7M** (BL4)
ii)	Explain about different computer networks.	**7M** (B2L)
	OR	
5.B. i)	Explain about IoT.	**4M** (BL2)
ii)	Explain briefly IoT applications.	**10M** (BL2)

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Usha Rama College of Engineering and Technology

Electrical and Electronics Engineering

Course Structure (UR19)

FIRST SEMESTER (I -YEAR) **Date: 05-08-2020**

I SEMESTER								
S. No	**Course Category**	**Course Code**	**Course Name**	**L**	**T**	**P**	**Contact Hrs./wk**	**C**
1	HMC	UR19HM101	Communicative English	2	0	0	2	2
2	BSC	UR19BSC105	Linear Algebra & Calculus	3	1	0	4	4
3	BSC	UR19BSC102	Applied Physics	3	0	0	3	3
4	ESC	UR19ESC106	Fundamentals of Computer Science	3	0	0	3	3
5	ESC	UR19ESC104	Engineering Graphics & Drafting	1	0	3	4	2.5
6	BSC	UR19BSCL103	Applied Physics Lab	0	0	3	3	1.5
7	ESC	UR19ESCL102	Engineering Workshop and IT Workshop	0	0	3	3	1.5
8	HSMC	UR19HML101	Communicative English Lab	0	0	2	2	1
MANDATORY COURSE								
9	BSC	UR19BSCL104	Applied Physics-Virtual Lab*	0	0	0	2	0
			Total	12	1	11	26	18.5
*Internal evaluation								

SECOND SEMESTER (I -YEAR)

II SEMESTER								
S. No	**Course Category**	**Course Code**	**Course Name**	**L**	**T**	**P**	**Contact Hrs./wk**	**C**
1	HMC	UR19HMC202	Professional English	2	0	0	2	2
2	BSC	UR19BSC208	Differential Equations & Vector Calculus	3	0	0	3	3
3	BSC	UR19BSC204	Applied Chemistry	3	0	0	3	3
4	ESC	UR19ESC207	Problem Solving & Programming Using C	3	0	0	3	3
5	ESC	UR19BSC109	Numerical Methods and Transforms	3	0	0	3	3
6	ESC	UR19ESC209	Electrical Circuit Analysis-I	3	0	0	3	3
7	ESC	UR19ESCL201	Problem Solving & Programming Using C Lab	0	0	3	3	1.5
8	BSC	UR19BSCL206	Applied Chemistry Lab	0	0	3	3	1.5
9	HMC	UR19HML202	Professional English Lab	0	0	3	3	1.5
			MANDATORY COURSES					
10	MC	UR19MC200	Engineering Exploration Project*	0	0	0	1	0
11	MC	UR19MC203	Constitution of India	0	0	0	2	0
			Total	17	0	9	29	21.5
*Internal evaluation								

THIRD SEMESTER (II-YEAR)

III SEMESTER								
S. No	**Course Category**	**Course Code**	**Course Name**	**L**	**T**	**P**	**Contact Hrs./wk**	**C**
1	PCC	UR19PCEE301	Electrical Machines-I	3	1	0	4	4
2	PCC	UR19PCEE302	Electrical Circuit Analysis-II	3	0	0	3	3
3	PCC	UR19PCEE303	Electromagnetic Field	2	1	0	3	3
4	PCC	UR19PCEE304	Electronic Devices and Circuits	3	0	0	3	3
5	PCC	UR19PCME305	Thermal and Hydro Prime Movers	2	0	0	2	2
6	HMC	UR19HM306	Managerial Economics and Financial Analysis	3	0	0	3	3
7	PCC	UR19PCEEL301	Electrical Circuit and Simulation Lab	0	0	3	3	1.5
8	PCC	UR19PCMEL302	Thermal and Hydro Lab	0	0	3	3	1.5
MANDATORY COURSE								
9	MC	UR19MC301	Environmental Studies	0	0	0	2	0
			Total	16	2	6	26	21
Employability Skills- I*							2	0
*Internal evaluation								

FOURTH SEMESTER (II-YEAR)

IV SEMESTER								
S. No	**Course Category**	**Course Code**	**Course Name**	**L**	**T**	**P**	**Contact Hrs./wk**	**C**
1	PCC	UR19PCEE401	Electrical Machines-II	3	1	0	4	4
2	PCC	UR19PCEE402	Power Systems-I	3	0	0	3	3
3	PCC	UR19PCEE403	Control Systems	2	1	0	3	3
4	PCC	UR19PCEE404	Switching Theory and Logic Design	2	1	0	3	3
5	PCC	UR19PCEE405	Electrical Measurements	3	0	0	3	3
6	PCC	UR19PCEEL401	Electrical Machines-I Lab	0	0	3	3	1.5
7	PCC	UR19PCEEL402	Electronic Devices and Circuits Lab	0	0	3	3	1.5
MANDATORY COURSES								
1	MC	UR19MC401	Professional Ethics and Human Values	0	0	0	2	0
2	PROJ	UR19MPROJ401	Socially Relevant Mini Project	0	0	0	2	0
			Total	14	2	6	26	19
Self Learning *(Technical Certificate)							1	0
*Internal evaluation								

FIFTH SEMESTER (III-YEAR)

V SEMESTER								
S. No	**Course Category**	**Course Code**	**Course Name**	**L**	**T**	**P**	**Contact Hrs./wk**	**C**
1	PCC	UR19PCEE501	Linear and Digital IC Applications	3	0	0	3	3
2	PCC	UR19PCEE502	Power Systems-II	3	0	0	3	3
3	PCC	UR19PCEE503	Power Electronics	3	0	0	3	3
4	PCC	UR19PCEE505	Signals and Systems	3	0	0	3	3
Professional Elective – I								
5	PEC	UR19PEEE501	Industrial Drives and Application	3	0	0	3	3
		UR19PEEE502	Smart Grid					
		UR19PEEE503	Renewable Energy sources					
		UR19PEEE504	Communication Systems					
		UR19PEEE505	Computer Networks					
6	PCC	UR19PCEEL501	Electrical Machines-II Lab	0	0	3	3	1.5
7	PCC	UR19PCEEL502	Electrical Measurements Lab	0	0	3	3	1.5
8	PCC	UR19PCEEL503	Control Systems Lab	0	0	3	3	1.5
MANDATORY COURSE								
9	ESC	UR19ESCL507	Virtual Electrical Machines Lab*	0	0	2	2	0
			Total	15	0	9	26	19.5
Employability Skills- II*							2	0
Self Learning *(Technical Certificate)							2	0
*Internal evaluation								

SIXTH SEMESTER (III-YEAR)

VI SEMESTER								
S. No	**Course Category**	**Course Code**	**Course Name**	**L**	**T**	**P**	**Contact Hrs./wk**	**C**
1	PCC	UR19PCEE601	Power Systems Analysis	3	0	0	3	3
2	HMC	UR19HM 602	Management Science	3	0	0	3	3
3	PCC	UR19PCEE603	Electrical Drives	3	0	0	3	3
4	PCC	UR19PCEEE504	Microprocessors and Microcontrollers	3	0	0	3	3
Professional Elective – II								
5	PEC	UR19PEEE601	Design of Electrical Apparatus	3	0	0	3	3
		UR19PEEE602	Electric Machine design					

		UR19PEEE603	Electrical Materials					
6	OEC		**Open Elective-I**	3	0	0	3	3
7	PCC	UR19PCEEL601	Power Electronics Lab	0	0	3	3	1.5
8	PCC	UR19PCEEL602	Microprocessors and Microcontrollers Lab	0	0	3	3	1.5
MANDATORY COURSES								
9	MC	UR19MC601	Essence of Indian Traditional Knowledge	0	0	0	2	0
10	ESC	UR19ESCL610	Virtual Power Lab*	0	0	2	2	0
12	PROJ	UR19MPROJ611	Socially Relevant Mini Project	0	0	0	2	0
			Total	18	0	6	30	21
*Internal evaluation								

SEVENTH SEMESTER (IV-YEAR)

VII SEMESTER								
S. No	**Course Category**	**Course Code**	**Course Name**	**L**	**T**	**P**	**Contact Hrs./wk**	**C**
1	PCC	UR19PCEE701	Switch Gear and Protection	3	0	0	3	3
2	PCC	UR19PCEE702	Utilization of Electrical Energy	3	0	0	3	3
Professional Elective – III								
3	PEC	UR19PEEE701	Digital Control Systems	3	0	0	3	3
		UR19PEEE702	Electrical and Electronics Instrumentation					
		UR19PEEE703	Electrical Distribution System					
Professional Elective – IV								
4	PEC	UR19PEEE704	Advanced Control Systems	3	0	0	3	3
		UR19PEEE705	Special Electrical Machines					
		UR19PEEE706	HVDC & EHV AC Transmission System					
5	OEC		**Open Elective – II**	3	0	0	3	3
7	PCC	UR19PCEEL701	Power Systems Lab	0	0	3	3	1.5
8	PCC	UR19PCEEL702	Electrical Simulation Lab	0	0	3	3	1.5
10	PROJ	UR19PROJEE711	Internship	0	0	0	0	2
11	PROJ	UR19PROJEE712	Project Phase-I (Literature Survey, Problem Identification)	0	0	3	0	1.5
			Total	15	0	9	21	21.5

EIGHT SEMESTER (IV-YEAR)

VIII SEMESTER								
S. No	**Course Category**	**Course Code**	**Course Name**	**L**	**T**	**P**	**Contact Hrs./wk**	**C**
1	PCC	UR19PCEE801	Power System Operation and Control	3	0	0	3	3
Professional Elective – V								
2	PEC	UR19PEEE801	FACTS	3	0	0	3	3
		UR19PEEE802	Power System Deregulation					
		UR19PEEE803	High Voltage Engineering					
3	OEC		**Open Elective – III**	3	0	0	3	3
4	PROJ	UR19PROJEE801	Project Phase-II	0	0	9	9	9
			Total	9	0	9	18	18

Total Credits = 18.5+21.5+21+19+19.5+21+21.5+18=160

List of Open Electives

Open Electives offered by the Dept. of CE

S.No.	Course Code	Open Elective-I
1.	UR19OECE 601	Introduction To GIS
2.	UR19OECE 602	Environmental Pollution Control
	Course Code	**Open Elective-II**
3.	UR19 OECE 701	Metro Systems and Engineering
4.	UR19 OECE 702	Natural Disaster Mitigation and Management
	Course Code	**Open Elective-III**
5.	UR19 OECE 801	Sanitary and Public Health Engineering
6.	UR19 OECE 802	Environmental and Industrial Hygiene

Open Electives offered by the Dept. of EEE

S.No.	Course Code	Open Elective-I
1.	UR19OEEE601	Neural Networks and Fuzzy Logic
2.	UR19OEEE602	Linear Control Systems
3.	UR19OEEE603	Electrical Safety Management
	Course Code	**Open Elective – II**
4.	UR19OEEE701	Programmable Logic Controllers
5.	UR19OEEE702	Energy Audit and Conservation Management
6.	UR19OEEE703	Electrical Technology
	Course Code	**Open Elective – III**
7.	UR19OEEE801	Non Conventional Energy Sources
8.	UR19OEEE802	Industrial Electrical Operation
9.	UR19OEEE803	Hybrid Electric Vehicles

Open Electives offered by the Dept. of ME

S.No.	Course Code	Open Elective-I
1.	UR19OEME601	Nano Technology
2.	UR19OEME602	Robotics
3.	UR19OEME603	Power Plant Engineering
	Course Code	**Open Elective-II**
4.	UR19OEME701	Operations Research
5.	UR19OEME702	Industrial Engineering & Quality control
6.	UR19-OEME703	Advanced materials
	Course Code	**Open Elective-III**
7.	UR19OEME801	Optimization Techniques
8.	UR19OEME802	Green Engineering systems
9.	UR19OEME803	Mechatronics

Open Electives offered by the Dept. of ECE

S.No.	Course Code	Open Elective-I
1	UR19OEEC 601	Consumer Electronics
2	UR19OEEC 602	Digital Electronics
	Course Code	**Open Elective-II**
3	UR19OEEC 701	Embedded Systems
4	UR19OEEC 702	Internet of Things (IoT)
	Course Code	**Open Elective-III**
5	UR19OEEC 801	Microcontrollers
6	UR19OEEC 802	Principles of Electronic Communications

Open Electives offered by the Dept. of CSE

S.No.	Course Code	Open Elective-I
1.	UR19OECS601	Java Programming
2.	UR19OECS602	Data Base Management Systems
3.	UR19OECS603	C++ Programming
	Course Code	**Open Elective-II**
4.	UR19OECS701	Distributed Computing
5.	UR19OECS702	Deep Learning
6.	UR19OECS703	AI and ML for Robotics
	Course Code	**Open Elective-III**
7.	UR19OECS801	AI Tools & Techniques
8.	UR19OECS802	Information Security
9.	UR19OECS803	Big Data

Open Electives offered by the Dept. of IT

S.No.	Course Code	Open Elective-I
1.	UR19OEIT101	Data Structures
2.	UR19OEIT102	Computer Graphics
3.	UR19OEIT103	Data Science
	Course Code	**Open Elective – II**
4.	UR19OEIT201	Operating Systems
5.	UR19OEIT202	Python Programming
6.	UR19OEIT203	Web Technologies
	Course Code	**Open Elective – III**
7.	UR19OEIT301	Information Security
8.	UR19OEIT302	Mobile Application Development
9.	UR19OEIT303	Block Chain Technologies

II Year - III Semester **COURSE CODE: UR19PCEE301** **L T P C**
3 1 0 4

Electrical Machines-I

Internal Marks: 30
External Marks: 70

Course Objective:

1. Appreciate the principles of electromagnetic energy conversion and understand the construction details of DC machine.
2. Understand the principle of operation and performance of DC generators. iii. Learn the characteristics and performance of DC generators.
3. Learn the characteristics and performance of DC motors.
4. Learn the speed control and testing methods of DC motors.
5. Learn the basic ideas of design of DC machines.

UNIT-I
Electromechanical Energy Conversion and introduction to DC machines
Principles of electromechanical energy conversion – singly excited and multi excited system – Calculation of force and torque using the concept of co-energy. Construction and principle of operation of DC machine – EMF equation for generator – Classification of DC machines based on excitation – OCC of DC shunt generator.

UNIT-II
Performance of D.C. Machines
Torque and back-emf equations of dc motors– Armature reaction and commutation – characteristics of separately-excited, shunt, series and compound motors - losses and efficiency-applications of dc motors.

UNIT-III
Starting, Speed Control and Testing of D.C. Machines
Necessity of starter – Starting by 3 point and 4 point starters – Speed control by armature voltage and field control – testing of DC machines - brake test, Swinburne's method – principle of regenerative or Hopkinson's method - retardation test -- separation of losses.

UNIT-IV
Single-phase Transformers
Types and constructional details - principle of operation - emf equation - operation on no load and on load – lagging, leading and unity power factors loads - phasor diagrams of transformers – equivalent circuit – regulation – losses and efficiency – effect of variation of frequency and supply voltage on losses – All day efficiency.

UNIT-V
Single-phase Transformers Testing
Tests on single phase transformers – open circuit and short circuit tests – Sumpner's test – separation of losses – parallel operation with equal voltage ratios – auto transformer - equivalent circuit – comparison with two winding transformers.

3-Phase Transformers

Polyphase connections - Y/Y, Y/Δ, Δ/Y, Δ/Δ and open Δ -- Third harmonics in phase voltages - three winding transformers: determination of Zp, Zs and Zt -- transients in switching – off load and on load tap changers -- Scott connection.

TEXT BOOKS

1. Electric Machinary – A. E. Fritzgerald, C. Kingsley and S. Umans, Mc Graw-Hill Companies, 5th editon.
2. Electrical Machines – P.S. Bimbra.3rd edition, Khanna Publishers

REFERENCE BOOKS

1. Performance and Design of D.C Machines – by Clayton & Hancock, 2nd edition, BPB. Publishers.
2. Electrical Machines -S.K. Battacharya, Mc Graw-Hill Companies, 4th editon.

3. Electric Machines by I.J. Nagrath & D.P. Kothari, Tata Mc Graw – Hill Publishers, 3rd edition, 2004.
4. Electromechanics – I (D.C. Machines) S. Kamakshaiah Hi-Tech Publishers, 2nd edition.

Course Outcomes:

1. Able to explain the concepts of electromagnetic energy conversion.
2. Able to explain the operation of dc generator, armature reaction and commutation.
3. Able to analyze the characteristics and performance of dc generators.
4. Able to explain the torque developed and performance of dc motors.
5. Able to analyze the speed control and testing methods of dc motors.
6. Able to propose design aspects of a dc machine.

II Year -III Semester **COURSE CODE: UR19PCEE302** **L T P C**
3 0 0 3

ELECTRICAL CIRCUIT ANALYSIS-II

Internal Marks: 30
External Marks: 70

Learning Objectives:

1. To study the concepts of balanced and unbalanced three-phase circuits.
2. To study the transient behavior of electrical networks with DC, pulse and AC excitations.
3. To study the performance of a network based on input and output excitation/response.
4. To understand the realization of electrical network function into electrical equivalent passive elements.
5. To understand the application of fourier series and fourier transforms for analysis of electrical circuits.

UNIT-I

Balanced Three phase circuits

Phase sequence- star and delta connection - relation between line and phase voltages and currents - analysis of balanced three phase circuits - measurement of active and reactive power, Numerical problems.

Unbalanced Three phase circuits

Analysis of three phase unbalanced circuits: Loop method – Star-Delta transformation technique, Two wattmeter methods for measurement of three phase power. Numerical problems

UNIT-II

Transient Analysis in DC and AC circuits

Transient response of R-L, R-C, R-L-C circuits for DC and AC excitations, Solution using differential equations and Laplace transforms. Numerical problems

UNIT-III

Two Port Networks

Two port network parameters – Z, Y, ABCD and Hybrid parameters and their relations, Cascaded networks. Numerical problems

UNIT-IV

Network synthesis

Positive real function - basic synthesis procedure - LC immittance functions - RC impedance functions and RL admittance function - RL impedance function and RC admittance function - Foster and Cauer methods. Numerical problems

UNIT-V

Fourier analysis and Transforms

Fourier theorem- Trigonometric form and exponential form of Fourier series, Conditions of symmetry- line spectra and phase angle spectra, Analysis of electrical circuits to non sinusoidal

periodic waveforms. Fourier integrals and Fourier transforms – properties of Fourier transforms physical significance of the Fourier Transform and its application to electrical circuits. Numerical problems

TEXT BOOKS:

1. Engineering Circuit Analysis by William Hayt and Jack E.Kemmerley, McGraw Hill Company, 6 th edition
2. Network synthesis: Van Valkenburg, 3rd edition, Prentice-Hall of India Private Ltd

REFERENCE BOOKS:

1. Fundamentals of Electrical Circuits by Charles K.Alexander and Mathew N.O.Sadiku, McGraw Hill Education (India)
2. Introduction to circuit analysis and design by TildonGlisson. Jr, Springer Publications.
3. Circuits by A.Bruce Carlson, Cengage Learning Publications
4. Network Theory Analysis and Synthesis by SmarajitGhosh, PHI publications
5. Networks and Systems by D. Roy Choudhury, New Age International publishers
6. Electric Circuits by David A. Bell, Oxford publications
7. Circuit Theory (Analysis and Synthesis) by A.Chakrabarthi,DhanpatRai&Co

8. Electrical Circuits and Network by KS. Suresh Kumar NIT Calicut, PEARSON education, 4th edition

Course Outcomes:

1. Students are able to solve three- phase circuits under balanced and unbalanced condition
2. Students are able find the transient response of electrical networks for different types of excitations.
3. Students are able to find parameters for different types of network.
4. Students are able to realize electrical equivalent network for a given network transfer function.
5. Students are able to extract different harmonics components from the response of a electrical network.
6. Students can understand to solve non linear problems.

II Year -III Semester **COURSE CODE: UR19PCEE303** **L T P C**
2 1 0 3

ELECTRO MAGNETIC FIELDS

Internal Marks: 30
External Marks: 70

Course Objectives:

1. Electromagnetic field is the foremost pre-requisite course for most of the subjects in Electrical Engineering.
2. To study the properties of conductors and dielectrics, calculate the capacitance of different configure-various and understand the concept of conduction and convection current densities.
3. The enunciation of basics of electrical elements R, L and C that are the building blocks of any electrical device or in the illustration of Energy transfer from mechanical to electrical and vice versa its role is crucial.
4. To develop the concept of self and mutual inductances and the energy stored.
5. To study the magnetic force and torque through Lorentz force equation in magnetic field environment like conductors and other current loops.
6. This course also includes the famous works of Coulomb, Ampere, Faraday, Maxwell etc. to the field of Electrical Engineering.

UNIT – I

Electrostatics:

Electrostatic Fields – Coulomb's Law – Electric Field Intensity (EFI) – EFI due to a line and a surface charge – Work done in moving a point charge in an electrostatic field – Electric Potential – Properties of potential function – Potential gradient – Guass's law — Maxwell's first law, div (D)=ρv Laplace's and Poison's equations and Solution of Laplace's equation in one variable.

UNIT – II

Conductors – Dielectrics and Capacitance:

Electric dipole – Dipole moment – potential and EFI due to an electric dipole – Torque on an Electric dipole in an electric field – Behaviour of conductors in an electric field – Conductors and Insulators Polarization – capacitance of parallel plates, spherical and coaxial cables with composite dielectrics –Energy stored and energy density in a static electric field – Current density – Ohm's law in point form .

UNIT – III

Magneto statics and Ampere's Law:

Static magnetic fields – Biot-Savart's law – Oesterd's experiment – Magnetic field intensity (MFI) – MFI due to a straight current carrying filament – MFI due to circular, square and solenoid current – Carrying wire – Relation between magnetic flux, magnetic flux density and MFI – Maxwell's second Equation, div(B)=0 –Ampere's circuital law– Point form of Ampere's circuital law –Field due to a circular loop, rectangular and square loops, Maxwell's third equation, Curl (H)=J.

UNIT – IV

Force in Magnetic fields:

Magnetic force - Moving charges in a Magnetic field – Lorentz force equation – force on a current element in a magnetic field – Force on a straight and a long current carrying conductor in a magnetic field –a differential current loop as a magnetic dipole – Torque on a current loop placed in a magnetic field.

UNIT – V

Self and Mutual inductance:

Self and Mutual inductance – determination of self-inductance of a solenoid and toroid and mutual inductance between a straight long wire and a square loop wire in the same plane – energy stored and density in a magnetic field.

Time Varying Fields:

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

TEXT BOOKS:

1. "Engineering Electromagnetics" by William H. Hayt & John. A. Buck Mc. Graw-Hill Companies, 7th Editon. 2006.
2. "Electromagnetic Field Theory" by Yaduvir Singh, 4th edition, Pearson Education.

REFERENCE BOOKS:

1. "Principles of Electro Magnetics" by Sadiku, Oxford Publications,4th edition.

2. "Introduction to Electro Dynamics" by D J Griffiths, Prentice-Hall of India Pvt. Ltd., 2nd edition.

3.Fundamentals of Engineering Electromagnetics by Sunil Bhooshan, Oxford higher education.

4. Electro magnetism : Problems with solutions by Ashutosh Pramanik, PHI Publications.

Course Outcomes:

1. Ability to calculate electric field and potentials using guass's law or solving Laplace's or Possion's equations.
2. Learn how to calculate capacitance, energy stored in dielectrics and get's the concept of conduction and convection currents.
3. Ability to find magnetic field intensity due to current, the application of ampere's law and the Maxwell's second and third equations.
4. Students can calculate the magnetic forces and torque produced by currents in magnetic field.
5. Will the able to calculate self and mutual inductances and the energy stored in the magnetic field.
6. Students will gain knowledge on time varying fields and get ability to calculate induced Emf. Concepts of displacement current and Poynting vector and associated problems are solved.

II Year -III Semester **COURSE CODE: UR19PCEE304** **L T P C**
3 0 0 3

ELECTRONIC DEVICES AND CIRCUITS

Internal Marks: 30
External Marks: 70

Course Objectives:

1. To learn the basics of semiconductor physics.
2. To study the construction details, operation and characteristics of various semiconductor diodes.
3. To understand the operation and analysis of rectifiers with and without filters. Further study the operation of series and shunt regulators using zener diodes.
4. To understand the basics of FET, Thyristors, Power IGBTs and Power MOSFETs.
5. To understand the concepts of positive and negative feedbacks and their role in amplifiers and oscillators.

UNIT-I

Review of Semi Conductor Physics

Insulators, Semi conductors, and Metals classification using Energy Band Diagrams, Mobility and Conductivity, Electrons and holes in Intrinsic Semi conductors, Extrinsic Semi Conductor, (P and N Type semiconductor) Hall effect, Generation and Recombination of Charges, Diffusion, Law of Junction, Introduction to fermi level in Intrinsic, Extrinsic semi conductors with necessary mathematics.

UNIT-II

Junction Diode Characteristics

Operation and characteristics of p-n junction diode. Current components in pn diode, diode equation. Temperature dependence on V–I characteristic, diffusion capacitance and diode resistance (static and dynamic).

Special Diodes: Avalanche and Zener break down, Zener characteristics, tunnel diode, characteristics with the help of energy band diagrams, Varactor diode, LED, PIN diode, Photo diode.

UNIT-III

Rectifiers and Regulators

Half wave rectifier, ripple factor, full wave rectifier (with and without transformer), harmonic components in a rectifier circuit, inductor filter, capacitor filter, L-section filter, Π- section filter. Simple circuit of a regulator using Zener diode. Types of regulators-series and shunt voltage regulators.

UNIT-IV

Transistors

Junction transistor, transistor current components, transistor as an amplifier and switch. Characteristics of transistor (CE, CB and CC configurations). Transistor biasing and thermal stabilization (to fixed bias, collector to base bias, self bias). Compensation against variation in base emitter voltage and collector current, Amplifiers and oscillators.

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UNIT- V

FET: JFET Characteristics (Qualitative explanation), MOFET Characteristics–static and Transfer (enhancement and depletion mode), low frequency model of FET, FET as an amplifier.

Power semiconductor devices

Principle of operation and characteristics of Thyristors, Silicon control rectifiers, power IGBT and power MOSFET their ratings.

Amplifiers and oscillators

Feedback Amplifiers -classification, feedback concept, transfer gain and general characteristics of negative feedback amplifiers, effect of feedback on input and output resistances. Methods of analysis of feedback amplifiers. Power Amplifiers – Classification, push-pull amplifiers. Oscillators – Condition for oscillation, RC-phase shift oscillator. Wein bridge oscillator, Crystal oscillator. .

TEXT BOOKS:

1. Electronic Devices and Circuits – J. Millman, C.C. Halkias, 3rd edition, Tata Mc-Graw Hill.
2. Electronic Devices and Circuits – R.L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall, 9thEdition, 2006.

REFERENCE BOOKS:

1. Electronic Devices and Circuits by David A. Bell, 4th edition, Oxford University Press.
2. Electronic Devices and Circuits – Salivahanan, Kumar, Vallavaraj, TATA Mc Graw Hill, Second Edition.
3. Electronics devices and circuits by Atul P. Godse, Uday, Bakshi, Technical Publication.

Course Outcomes:

1. Students are able to understand the basic concepts of semiconductor physics, which are useful to understand the operation of diodes and transistors.
2. Students are able to explain the operation and characteristics of PN junction diode and special diodes.
3. Ability to understand operation and design aspects of rectifiers and regulators.
4. Students are able to understand the operation and characteristics of FET, Thyristors, Power IGBTs and Power MOSFETs.
5. Students are able to understand the merits and demerits of positive and negative feedback and the role of feedback in oscillators and amplifiers.
6. Students are able to understand the importance of different feedback.

II Year - III Semester **COURSE CODE: UR19PCME305** **L T P C**
2 0 0 2

THERMAL AND HYDRO PRIME MOVERS

Internal Marks: 30
External Marks: 70

Course Objective:

1. To make the student understand the types of prime movers, which can be connected to generators for power production and should obtain the skills of performing the necessary calculations with respect to the functioning of the prime movers.
2. To make the student learn about the constructional features, operational details of various types of internal combustion engines through the details of several engine systems and the basic air standard cycles, that govern the engines.
3. To train the student in the aspects of steam formation and its utilities through the standard steam data tables and charts. To make the student correlate between the air standard cycles and the actual cycles that govern the steam turbines.
4. To make the student learn about the constructional features, operational details of various types of hydraulic turbines.
5. To teach the student about the fundamental of fluid dynamic equations and its applications fluid jets.

Part-A: Thermal prime movers

UNIT- I

I.C Engines

Classification, working principles – valve and port timing diagrams – air standard cycles – Engine systems line fuel injection, carburetion, ignition, cooling and lubrication – Engine performance evaluation.

UNIT -II

Properties of Steam and use of Steam Tables- T-S and H-S Diagrams. Analysis of Various Thermodynamic Processes under gone by Steam.

Vapor Power Cycles: Carnot Cycle-Rankine Cycle- Thermodynamic Variables Effecting Efficiency and output of Rankine Cycle-. Analysis of simple Rankine Cycle and Re-heat cycle.

Steam Turbines: Schematic layout of steam power plant Classification of Steam Turbines- Impulse Turbine and Reaction Turbine

UNIT -III

Gas Turbines

Simple gas turbine plant-ideal cycle, closed cycle -open cycle-. Efficiency, Work ratio and optimum pressure ratio for simple gas turbine cycle. Actual cycle, analysis of simple cycles & cycles with inter cooling, reheating and Regeneration.

Part-B: Hydro prime movers

UNIT- IV

IMPACT OF JETS AND PUMPS

Impulse momentum equation, Impact of Jet on stationary and moving vanes (flat and curved). Pumps: Types of pumps, Centrifugal pumps: Main components, Working principle, Multi stage pumps.

UNIT- V

HYDRAULIC TURBINES

Classification of turbines; Working principle, Efficiency calculation and Design principles for Pelton Wheel, Francis and for Kaplan turbines; Governing of turbines; Performance and characteristic curves.

HYDRO POWER

Components of Hydro electric power plant: pumped storage systems, load curve, load factor, capacity factor, utilization factor, diversity factor, load – duration curve, firm power, secondary power.

TEXT BOOKS:

1. Thermal Engineering by Rajput, Lakshmi publications
2. Thermal engineering by M.L.Mathur and F.S.Mehta, Jain Brothers.
3. "Hydraulics & Fluid Mechanics", P.N. Modi and S.M. Seth, TEXT BOOKS House, Delhi
4. "Fluid Mechanics & Hydraulic Machinery" A.K.Jain, , Khanna Publishers, Delhi.

REFERENCE BOOKS:

1. "Fluid Mechanics" by Victor. L. Streeter.
2. "Introduction to Fluid Mechanics" Edward .J. Shaughnessy Jr.
3. "Fluid Mechanics & Its Applications", Vijay Gupta, Santhosh. K.Gupta.
4. "Fluid Mechanics & Fluid power Engineering, Dr D.S. Kumar.
5. "Water Power Engineering" M.M Desumukh.

Course Outcomes:

1. Further, the student shall be able to calculate the performance of different types of internal combustion engines.
2. To train the student to calculate the performance of steam turbines using velocity diagrams.
3. To impart the knowledge of gas turbine fundamentals, the governing cycles and the methods to improve the efficiency of gas turbines.
4. To impart the knowledge of various types of pumps, their constructional features, working and performance.
5. Further, the student shall be able to calculate the performance of hydraulic turbines.
6. To train the student in the areas of types of hydro electric power plants, estimation and calculation of different loads by considering various factors.

II Year -III Semester **COURSE CODE: UR19HSMC306** **L T P C**
3 0 0 3

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Internal Marks: 30
External Marks: 70

Course Objectives:

1. To understand the concept and nature of Managerial Economic s and its relationship with other disciplines, Concept of Demand and Demand forecasting
2. To understand the concept of Production function, Input Output relationship, different Cost Concepts and Concept of Cost-Volume-Profit Analysis
3. To understand the Nature of Competition, Characteristics of Pricing in the different market structure and significance of various pricing methods.
4. To know the different forms of Business organization and their Merits and Demerits both public & private Enterprises and the concepts of Business Cycles.
5. To understand the different Accounting Systems preparation of Financial Statements and uses of different tools for performance evaluation.
6. To understand the concept of Capital, Capitalization, Capital Budgeting and to know the techniques used to evaluate Capital Budgeting proposals by using different meth

Unit – I:

Introduction to Managerial Economics and demand Analysis:

Definition of Managerial Economics and Scope-Managerial Economics and its relation with other subjects-Concepts of Demand-Types-Determents-Law of Demand its Exception-Elasticity of Demand-Types and Measurement- Demand forecasting and its Methods.

Unit – II:

Production and Cost Analyses:

Production function-Isoquants and Isocosts-Law of Variable proportions- Cobb-Douglas Production function-Economics of Sale-Cost Concepts- Opportunity Cost-Fixed vs Variable Costs-Explicit Costs vs Implicit Costs- Out of Pocket Costs vs Imputed Costs-Cost Volume Profit analysis- Determination of Break-Even Point (Simple Problem).

Unit – III:

Introduction to Markets, Theories of the Firm & Pricing Policies:

Market Structures: Perfect Competition, Monopoly and Monopolistic and Oligopoly – Features – Price, Output Determination – Managerial Theories of firm: Maris and Williamson's models – Methods of Pricing: Limit Pricing, Market Skimming Pricing.

Unit – IV:

Types of Business Organization and Business Cycles:

Features and Evaluation of Sole Trader – Partnership – Joint Stock Company – State/Public Enterprises and their forms – Business Cycles – Meaning and Features – Phases of Business Cycle.

Unit – V:

Introduction to Accounting & Financing Analysis:

Introduction to Double Entry Systems – Preparation of Financial Statements- Analysis and Interpretation of Financial Statements-Ratio Analysis – Preparation of Funds flow cash flow statements (Simple Problems)

Capital and Capital Budgeting: Capital Budgeting: Meaning of Capital- Capitalization-Meaning of Capital Budgeting-Need for Capital Budgeting- Techniques of Capital Budgeting-Traditional and Modern Methods.

TEXT BOOKS

1. Dr. N. Appa Rao, Dr. P. Vijay Kumar: 'Managerial Economics and Financial Analysis', Cengage Publications, New Delhi – 2011.
2. Dr. A. R. Aryasri – Managerial Economics and Financial Analysis, TMH 2011.
3. Prof. J.V.Prabhakara Rao, Prof. P. Venkatarao. 'Managerial Economics and Financial Analysis', Ravindra Publication.

REFERENCE BOOKS:

1. V. Maheswari : Managerial Economics, Sultan Chand.
2. Suma Damodaran : Managerial Economics, Oxford 2011.
3. Dr. B. Kuberudu and Dr. T. V. Ramana : Managerial Economics & Financial Analysis, Himalaya Publishing House 2011.
4. Vanitha Agarwal : Managerial Economics, Pearson Publications 2011.
5. Sanjay Dhameja : Financial Accounting for Managers, Pearson.
6. Maheswari : Financial Accounting, Vikas Publications.
7. S. A. Siddiqui & A. S. Siddiqui : Managerial Economics and Financial Analysis, New Age International Publishers, 2012

Course Outcomes:

1. The Learner is equipped with the knowledge of estimating the Demand for a product and the relationship between Price and Demand
2. One should understand the Cost Concepts for decision making and to estimate the least cost combination of inputs
3. One has to understand the nature of different markets and Price Output determination under various market conditions
4. One should equipped with the knowledge of different Business Units
5. The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis
6. The Learner is able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making

II Year -III Semester **COURSE CODE: UR19PCEEL307**

L	T	P	C
0	0	3	1.5

ELECTRICAL CIRCUITS AND SIMULATION LAB

Internal Marks: 20
External Marks: 30

Course Objectives:

1. To verify and demonstrate various theorems, locus diagrams, resonance and two port networks.
2. To determine self and mutual inductance of a magnetic circuit, parameters of a given coil and measurement of 3- phase power
3. To simulate integrator circuit, differentiator circuit, Boost converter, Buck converter, full convertor and PWM inverter.

Any 6 of the following experiments are to be conducted:

1) Verification of Thevenin's and Norton's Theorems
2) Verification of Superposition theorem and Maximum Power Transfer Theorem
3) Verification of Compensation Theorem
4) Verification of Reciprocity , Millmann's Theorems
5) Locus Diagrams of RL and RC Series Circuits
6) Series and Parallel Resonance
7) Determination of Self, Mutual Inductances and Coefficient of coupling
8) Z and Y Parameters
9) Transmission and hybrid parameters
10) Parameters of a choke coil.
11) Determination of cold and hot resistance of an electric lamp.
12) Measurement of 3-phase Power by two Wattmeter Method for balanced and unbalanced loads

Any 4 of the following PSPICE experiments are to be conducted:

1. Simulation of transient response of RLC circuits
a. Response to pulse, step, sinusoidal inputs
2. Verification of Thevenin's and Norton's Theorems of given circuir.
3. Verification of Superposition theorem of given circuir.
4. Verification of maximum power transfer of given circuir.
5. Verification of Reciprocity of given circuir.

Course Outcomes:

1. Able to perform theorems, locus diagrams, resonance and two port networks.
2. To determine mutual inductance of a magnetic circuit.
3. To understand operation of Boost converter, Buck converter, full convertor and PWM inverter.

Note:

Minimum 12 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations.

In case if the student fails to get eligibility for semester end exams in the current semester, he has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted.

II Year -III Semester **COURSE CODE: UR19PCMEL308**

L	T	P	C
0	0	3	1.5

FLUID MECHANICS AND HYDRAULIC MACHINERY LAB

Internal Marks: 20
External Marks: 30

Course Objective:

1. To impart practical knowledge on the performance evaluation methods of various internal combustion engines, flow measuring equipment and hydraulic turbines and pumps.

NOTE: To conduct a minimum of 12 experiments by conducting a minimum of six from each section.

SECTION A - THERMAL ENGINEERING LAB

1. I.C. Engines valve / port timing diagrams.
2. I.C. Engines performance test on 4 -stroke Diesel engine.
3. I.C. Engines performance test on 2-stroke petrol engine.
4. Evaluation of engine friction by conducting Morse test on 4-stroke multi cylinder petrol Engine
5. Determination of FHP by retardation and motoring test on IC engine
6. I.C. Engines heat balance on petrol / Diesel engines.
7. Economical speed test of an IC engine
8. Study of boilers

SECTION B – HYDRAULIC MACHINES LAB

1. Impact of jets on Vanes.
2. Performance Test on Pelton Wheel.
3. Performance Test on Francis Turbine.
4. Performance Test on Kaplan Turbine.
5. Performance Test on Single Stage Centrifugal Pump.
6. Performance Test on Reciprocating Pump.
7. Calibration of Venturimeter.
8. Calibration of Orifice meter.
9. Determination of loss of head due to sudden contraction in a pipe line.

Note:

Minimum 12 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations.

In case if the student fails to get eligibility for semester end exams in the current semester, he has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted.

II Year -III Semester	COURSE CODE: UR19MC301	L T P C
		0 0 0 0

ENVIRONMENTAL STUDIES

Course Objectives:

- Overall understanding of the natural resources
- Basic understanding of the ecosystem and its diversity
- Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities
- An understanding of the environmental impact of developmental activities
- Awareness on the social issues, environmental legislation and global treaties.

UNIT – I

Multidisciplinary nature of Environmental Studies: Definition, Scope andImportance – Sustainability: Stockholm and Rio Summit–Global Environmental Challenges: Global warming and climate change, Carbon Credits, acid rains, ozone layer depletion, population growth and explosion, effects. Role of information Technology in Environment and human health.

Ecosystems: Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem – Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

UNIT – II

Natural Resources: Natural resources and associated problems Forest resources–Use and over–exploitation, deforestation–Timber extraction–Mining, dams and other effects on forest and tribal people Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, Sustainable mining of Granite, Literate, Coal, Sea and River sands.

Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources Vs Oil and Natural Gas Extraction.

Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

UNIT – III

Biodiversity and its conservation:

Definition: genetic, species and ecosystem diversity classification - Value of biodiversity: consumptive use, productive use, social-Biodiversity at national and local levels. India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, man-wildlife conflicts - Endangered and endemic species of India – Conservation of biodiversity: conservation of biodiversity.

UNIT – IV

Environmental Pollution: Definition, Cause, effects and control measures of air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies, Sustainable Life Studies. Impact of Fire Crackers on Men and his well being.

Solid Waste Management: Sources, Classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products, Biomedical, Hazardous and e – waste management.

UNIT – V

Social Issues and the Environment: Urban problems related to energy –Water conservation, rain water harvesting-Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issues and possible solutions. Environmental Protection Act –Air (Prevention and Control of Pollution) Act. –Water (Prevention and control of Pollution) Act - Wildlife Protection Act -Forest Conservation Act-Issues involved in enforcement of environmental legislation. -Public awareness.

Environmental Management: Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS, Environmental audit. Ecotourism, Green Campus – Green business and Green politics. The student should Visit an Industry / Ecosystem and submit a report individually on any issues related to Environmental Studies course and make a power point presentation.

TEXT BOOKS:

1. Environmental Studies, K. V. S. G. Murali Krishna, VGS Publishers, Vijayawada.
2. Environmental Studies, R. Rajagopalan, 2nd Edition, 2011, Oxford University Press.
3. Environmental Studies, P. N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai.

REFERENCE BOOKS:

1. Text Book of Environmental Studies, Deeshita Dave & P. UdayaBhaskar, Cengage Learning.
2. A Textbook of Environmental Studies, ShaashiChawla, TMH, New Delhi.
3. Environmental Studies, Benny Joseph, Tata McGraw Hill Co, New Delhi.
4. Perspectives in Environment Studies, AnubhaKaushik, C P Kaushik, New Age International Publishers, 2014.

Course Outcomes:

Upon completion of the course, the students will be able to

CO1: Identify the natural resources, ecology, Biodiversity, and conservation of natural resources

CO2: Explain various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices

CO3: Judge the social issues both rural and urban environment and the possible means to combat the challenges

CO4: Identify the Environmental Impact Assessment and environmental legislations of India and global initiatives towards sustainable development.
CO5: Analyze the concept of Biodiversity and its conservation
CO6: Survey the concept of Solid Waste Management.

II Year -IV Semester **COURSE CODE: UR19PCEE401** **L T P C**
3 1 0 4

ELECTRICAL MACHINES – II

Internal Marks: 30
External Marks: 70

Course Objectives:

1. Appreciate the concept of operation and performance of single phase transformers.
2. Understand the methods of testing of single-phase transformer.
3. Distinguish between single-phase and three-phase transformers.
4. Understand the concept of operation and performance of 3-phase induction motor.
5. Appreciate the relation between torque and slip, performance of induction motor and induction generator.
6. Understand the basic concepts of design of transformers and 3-phase induction motors.

UNIT-I
3-phase Induction Motors
Construction details of cage and wound rotor machines - production of rotating magnetic field - principle of operation - rotor emf and rotor frequency - rotor current and pf at standstill and during running conditions - rotor power input, rotor copper loss and mechanical power developed and their interrelationship – equivalent circuit – phasor diagram

UNIT-II
Characteristics, starting and testing methods of Induction Motors
Torque equation - expressions for maximum torque and starting torque - torque slip characteristic - double cage and deep bar rotors - crawling and cogging – speed control of induction motor with V/f method – no load and blocked rotor tests - circle diagram for predetermination of performance– methods of starting – starting current and torque calculations – induction generator operation (Qualitative treatment only)

UNIT – III:
Single Phase Motors
Single phase induction motors – Constructional features and equivalent circuit–Double revolving field theory–Starting methods, shaded pole motors, AC Series motor.

UNIT–IV:
Construction, Operation and Voltage Regulation of Synchronous generator
Constructional features of non–salient and salient pole type – Armature windings – Distributed and concentrated windings – Distribution– Pitch and winding factors –E.M.F equation– Improvements of waveform and armature reaction–Voltage regulation by synchronous impedance method– MMF method and Potier triangle method–Phasor diagrams– Two reaction analysis of salient pole machines and phasor diagram.

UNIT –V:

Parallel operation of synchronous generators

Parallel operation with infinite bus and other alternators – Synchronizing power – Load sharing – Control of real and reactive power– Numerical problems.

Synchronous motor – operation, starting and performance

Synchronous Motor principle and theory of operation– Phasor diagram – Starting torque– Variation of current and power factor with excitation –Synchronous condenser – Mathematical analysis for power developed– Hunting and its suppression – Methods of starting – Applications circuit (qualitative treatment only).

TEXT BOOKS:

1. Electrical Machines – P.S. Bimbra., 3rd edition, Khanna Publishers
2. Electrical Machines by D P.Kothari, I .J .Nagarth,Mc GrawHill Publications, 4th edition

REFERENCE BOOKS:

1.Electrical Machines by R.K.Rajput, Lakshmi publications,Fifth edition
2.Electrical Machines by J.B.Guptha. 4th edition, S.K.Kataria & Sons

Course Outcomes:

1. Able to explain the operation and performance of single phase transformer.
2. Able to explain the regulation losses and efficiency of single phase transformer.
3. Able to explain types of three phase transformer connection, tap changing methods and 3-phase to 2-phase transformation.
4. Able to explain the operation and performance of three phase induction motor.
5. Able to analyze the torque-speed relation, performance of induction motor and induction generator.
6. Able to explain design procedure for transformers and three phase induction motors.

II Year -IV Semester **COURSE CODE: UR19PCEE402** **L T P C**
3 0 0 3

POWER SYSTEMS-I

Internal Marks: 30
External Marks: 70

Course Objectives :

1. To study the principle of operation of different components of a thermal power stations.
2. To study the principle of operation of different components of a Nuclear power stations.
3. To study the concepts of DC/AC distribution systems and voltage drop calculations.
4. To study the constructional and operation of different components of an Air and Gas Insulated substations.
5. To study the constructional details of different types of cables.
6. To study different types of load curves and tariffs applicable to consumers.

UNIT-I

Thermal Power Stations

Selection of site, general layout of a thermal power plant showing paths of coal, steam, water, air, ash and flue gasses, ash handling system, Brief description of components: Boilers, Super heaters, Economizers, electrostatic precipitators steam Turbines turbo alternators, Condensers, feed water circuit, Cooling towers and Chimney.

UNIT-II

Nuclear Power Stations

Location of nuclear power plant, working principle, nuclear fission, nuclear fuels, nuclear chain reaction, nuclear reactor Components: Moderators, Control rods, Reflectors and Coolants. Types of Nuclear reactors and brief description of PWR, BWR and FBR. Radiation: Radiation hazards and Shielding, nuclear waste disposal.

UNIT-III

Renewable power plants:

Solar power generation. Photovoltaic and solar, concentrators. Wind power generation: Types of wind mills, wind generators, tidal, biomass, geothermal and micro, hydel power plants, fuel cells.

UNIT-IV

Substation:

Classification of substations: Air insulated substations- Indoor & Outdoor substations: Substations layout showing the location of all the substation equipment. Bus bar arrangements
Gas insulated substations (GIS) – Advantages , different types , single line diagram , Bus bar arrangement, construction aspects of GIS, Substation automation.

UNIT-V.

Economic Aspects of Power Generation

Economic Aspects - Load curve, load duration and integrated load duration curves, discussion on economic aspects: connected load, maximum demand, demand factor, load factor, diversity factor, power capacity factor and plant use factor, Base and peak load plants.

Tariff Methods- Costs of Generation and their division into Fixed, Semi-fixed and Running Costs, Desirable Characteristics of a Tariff Method, Tariff Methods: Simple rate, Flat Rate, Block-Rate, two-part, three–part, and power factor tariff methods.

TEXT BOOKS:

1. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S.Bhatnagarand A. Chakrabarti, Dhanpat Rai 5th edition & Co. Pvt. Ltd.
2. Generation, Distribution and Utilization of Electric Energy by C.L.Wadhawa, 4th edition, New age International (P) Limited, Publishers.

REFERENCE BOOKS:

1. Electrical Power Distribution Systems by - V. Kamaraju, TataMcGraw Hill, New Delhi.
2. Elements of Electrical Power Station Design by – M V Deshpande, PHI, New Delhi.

Course Outcomes:

1. Students are able to identify the different components of thermal power plants.
2. Students are able to identify the different components of nuclear Power plants.
3. Students are able to distinguish between AC/DC distribution systems and also estimate voltage drops of distribution systems.
4. Students are able to identify the different components of air and gas insulated substations.
5. Students are able to identifys ingle core and multi core cables with different insulating materials.
6. Students are able to analyze the different economic factors of power generation and tariffs.

II Year -IV Semester **COURSE CODE: UR19PCEE403** **L T P C**
2 1 0 3

CONTROL SYSTEMS

Internal Marks: 30
External Marks: 70

Course Objective:

1. To learn the mathematical modeling of physical systems and to use block diagram algebra and signal flow graph to determine overall transfer function.
2. To analyze the time response of first and second order systems and improvement of performance by proportional plus derivative and proportional plus integral controllers.
3. To investigate the stability of closed loop systems using Routh's stability criterion and the analysis by root locus method.
4. To present the Frequency Response approaches for the analysis of linear time invariant (LTI) systems using Bode plots, polar plots and Nyquist stability criterion.
5. To discuss basic aspects of design and compensation of linear control systems using Bode plots.
6. Ability to formulate state models and analyze the systems. To present the concepts of Controllability and Observability.

UNIT – I:
MATHEMATICAL MODELING OF CONTROL SYSTEMS
Open Loop and closed loop control systems and their differences, Classification of control systems, transfer function of linear system, Differential equations of electrical networks, Translational and Rotational mechanical systems, Transfer Function of DC
Servo motor - AC Servo motor , Block diagram algebra – Signal flow graph - Reduction using Mason's gain formula.

UNIT-II:
TIME RESPONSE ANALYSIS
Standard test signals - Time response of first order systems –Time response of second order systems - Time domain specifications - Steady state errors and error constants – Feed-Back Characteristics, PID controllers.
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UNIT – III:
STABILITY AND ROOTLOCUS TECHNIQUE
The concept of stability – Routh's stability criterion –limitations of Routh's stability – The root locus concept - construction of root loci (Simple problems). Effect of open loop poles and zeros on rootlocus.

UNIT–IV:
FREQUENCY RESPONSE ANALYSIS
Introduction, Frequency domain specifications-Bode diagrams- transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots, Polar Plots, Nyquist Stability criterion, Sinusoidal transfer function, Minimum and non-minimum phase systems.

UNIT–V:

CLASSICAL CONTROL DESIGN TECHNIQUES

Lag, Lead, Lag-Lead compensators, design of compensators – using Bode plots.

STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS

Concepts of state, state variables and state model, state space representation of transfer function, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and it's Properties – Concepts of Controllability and Observability.

TEXT BOOKS:

1. Modern Control Engineering, Kotsuhiko Ogata, 4th edition, Prentice Hall of India.
2. Automatic control systems, Benjamin C.Kuo, Prentice Hall of India, 2nd Edition.
3. Control Systems Engineering, Norman S.Nise, 6th edition, Wiley publication.

REFERENCE BOOKS:

1. Control Systems, Manik Dhanesh N, 3rd edition, Cengage publications .
2. Control Systems principles and design, M.Gopal, Tata Mc Graw Hill education Pvt Ltd., 4th Edition.
3. Control Systems Engineering, S.Palani, 4th edition, Tata Mc Graw Hill Publications.

Course Outcome:

1. Ability to represent physical systems as state models and determine the response. Understanding the concepts of controllability and observability.
2. Ability to derive the transfer function of physical systems and determination of overall transfer function using block diagram algebra and signal flow graphs.
3. Capability to determine time response specifications of second order systems and to determine error constants.
4. Acquires the skill to analyze absolute and relative stability of LTI systems using Routh's stability criterion and the root locus method.
5. Capable to analyze the stability of LTI systems using frequency response methods.
6. Able to design Lag, Lead, Lag-Lead compensators to improve system performance from Bode diagrams.

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II Year -IV Semester **COURSE CODE: UR19PCEE404** **L T P C**
2 1 0 3

SWITCHING THEORY AND LOGIC DESIGN

Internal Marks: 30
External Marks: 70

Course Objectives:
This course provides in-depth knowledge of switching theory and the design techniques of digital circuits, which is the basis for design of any digital circuit. The main objectives are:

1. To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
2. To understand common forms of number representation in digital electronic circuits and to be able to convert between different representations.
3. To implement simple logical operations using combinational logic circuits
4. To design combinational logic circuits, sequential logic circuits.
5. To impart to student the concepts of sequential circuits, enabling them to analyze sequential systems in terms of state machines.

UNIT – I
REVIEW OF NUMBER OF SYSTEMS & CODES:
i) Representation of numbers of different radix, conversation from one radix to another radix, r-1's compliments and r's compliments of signed members, problem solving. ii) 4 bit codes, BCD, Excess-3, 2421, 84-2-1 9's compliment code etc., iii) Logic operations and error detection & correction codes; Basic logic operations -NOT, OR, AND, NAND-NAND and NOR-NOR realizations. Universal building blocks, EX-OR, EX-NOR - Gates, Standard SOP and POS, Forms, Gray code, error detection, error correction codes (parity checking, even parity, odd parity, Hamming code).

UNIT – II
MINIMIZATION TECHNIQUES:
Boolean theorems, principle of complementation & duality, De-morgan theorems, minimization of logic functions using Boolean theorems, minimization of switching functions using K-Map up to 6 variables, tabular minimization, code-converters using K-Map etc..

UNIT – III
COMBINATIONAL LOGIC CIRCUITS DESIGN:
Design of Half adder, full adder, half subtractor, full subtractor, applications of full adders, 4-bit binary subtractor, adder-subtractor circuit, BCD adder circuit, Excess 3 adder circuit, look-a-head adder circuit, Design of decoder, demultiplexer, 7 segment decoder, higher order demultiplexing, encoder, multiplexer, higher order multiplexing, realization of Boolean functions using decoders and multiplexers, priority encoder, 4-bit digital comparator.

UNIT – IV

INTRODUCTION OF PLD's :

PROM, PAL, PLA-Basics structures, realization of Boolean function with PLDs, programming tables of PLDs, merits & demerits of PROM, PAL, PLA comparison, realization of Boolean functions using PROM, PAL, PLA, programming tables of PROM, PAL, PLA.

UNIT – V

SEQUENTIAL CIRCUITS I:

Classification of sequential circuits (synchronous and asynchronous); basic flip-flops, truth tables and excitation tables (nand RS latch, nor RS latch, RS flip-flop, JK flip-flop, T flip-flop, D flip-flop with reset and clear terminals). Conversion from one flip-flop to flip-flop. Design of ripple counters, design of synchronous counters, Johnson counter, ring counter. Design of registers - Buffer register, control buffer register, shift register.

SEQUENTIAL CIRCUITS II :

Finite state machine; Analysis of clocked sequential circuits, state diagrams, state tables, reduction of state tables and state assignment, design procedures. Realization of circuits using various flip-flops.

TEXT BOOKS:

1. Switching Theory and Logic Design by Hill and Peterson 3rd edition, Mc-Graw Hill TMH edition.
2. Switching Theory and Logic Design by A. Anand Kumar, 4th edition, PHI publications
3. Digital Design by MM Mano, 6th edition, Pearson publication .

REFERENCE BOOKS:

1. Modern Digital Electronics by RP Jain, 2nd edition, TMH.
2. Fundamentals of Logic Design by Charles H. Roth Jr, 3rd edition, Jaico Publishers.
3. Micro electronics by Milliman, 4th edition, TMH edition.

Course Outcomes:

1. Be able to manipulate numeric information in different forms, e.g. different bases, signed integers, various codes such as ASCII, Gray, and BCD.
2. Be able to manipulate simple Boolean expressions using the theorems and postulates of Boolean algebra and to minimize combinational functions.
3. Be able to design and analyse small combinational circuits and to use standard combinational functions/building blocks to build larger more complex circuits.
4. Be able to design and analyze small sequential circuits and devices and to use standard sequential functions/building blocks to build larger more complex circuits.
5. Students able to understand registers.
6. To implement synchronous state machines using flip-flops.

II Year -IV Semester **COURSE CODE: UR19PCEE405** **L T P C**
2 1 0 3

ELECTRICAL MEASUREMENTS

Internal Marks: 30
External Marks: 70

Course Objectives:

1. To study the principle of operation and working of different types of instruments. measurement of voltage and current.
2. To study the working principle of operation of different types of instruments for measurement of power and energy
3. To understand the principle of operation and working of dc and ac potentiometers.
4. To understand the principle of operation and working of various types of bridges for measurement of parameters –resistance, inductance, capacitance and frequency.
5. To study the principle of operation and working of various types of magnetic measuring instruments.
6. To study the applications of CRO for measurement of frequency, phase difference and hysteresis loop using Lissajous patterns

UNIT–I:

Measuring Instruments

Classification – Deflecting, control and damping torques – Ammeters and Voltmeters – PMMC, moving iron type, dynamometer and electrostatic instruments – Expression for the deflecting torque and control torque – Errors and compensations–CT and PT**:** Ratio and phase angle errors – Numerical problems.

UNIT –II:

Measurement of Power and Energy

Single phase and three phase dynamometer wattmeter – LPF and UPF – Expression for deflecting and control torques – Extension of range of wattmeter using instrument transformers – Type of P.F. Meters – Single phase and three phase dynamometer and moving iron type Single phase induction type energy meter – Driving and braking torques – errors and compensations — Three phase energy meter – Weston type synchro-scope.

UNIT – III:

Potentiometers

Principle and operation of D.C. Crompton's potentiometer – Standardization – Measurement of unknown resistance – Measurement of unknown Current – Measurement of unknown oltage.AC Potentiometers**:** polar and coordinate types – Standardization – Applications.

UNIT – IV:

Measurements of Parameters

Method of measuring low, medium and high resistance – Sensitivity of Wheat stone's bridge – Carey Foster's bridge– Kelvin's double bridge for measuring low resistance– Loss of charge method for measurement of high resistance – Megger– Measurement of earth resistance – Measurement of inductance – Quality Factor – Maxwell's bridge–Anderson's bridge– Measurement of capacitance and loss angle — Schering Bridge.

UNIT – V:

Magnetic Measurements

Ballistic galvanometer – Equation of motion – Flux meter – Constructional details–Core loss measurements by bridges and potentiometers.

Digital Meters

Digital Voltmeter–Successive approximation – Measurement of phase difference – Frequency – – Ramp and integrating type– Digital frequency meter–Digital multimeter–Digital Tachometer.

Text Books:

1. Electrical Measurements and measuring Instruments – by E.W. Golding and F.C.Widdis, fifth Edition, Wheeler Publishing.
2. Modern Electronic Instrumentation and Measurement Techniques – A.D. Helfrick and W.D. Cooper, PHI, 5th Edition, 2002.
3. Electronic Instrumentation and Measurements by DA Bell, 3rd edition Oxford Higher Education

Reference Books:

1. Electrical & Electronic Measurement & Instruments by A.K.Sawhney Dhanpat Rai & Co.Publications.
2. Electrical and Electronic Measurements and instrumentation by R.K.Rajput, S.Chand.
3. Electrical Measurements – by Buckingham and Price, Prentice – Hall
4. Electrical Measurements by Forest K. Harris. John Wiley and Sons

Course Outcomes:

1. Able to choose right type of instrument for measurement of voltage and current for ac and dc.
2. Able to choose right type of instrument for measurement of power and energy –
3. able to calibrate energy meter by suitable method
4. Able to calibrate ammeter and potentiometer.
5. Able to select suitable bridge for measurement of electrical parameters
6. Able to use the ballistic galvanometer and flux meter for magnetic measuring instruments And also measure frequency and phase difference between sign.

II Year -IV Semester **COURSE CODE: UR19PCEEL406**

L	T	P	C
0	0	3	1.5

ELECTRICAL MACHINES-I LAB

Internal Marks: 20
External Marks: 30

Course Objectives:

1. To plot the magnetizing characteristics of DC shunt generator and understand the mechanism of self-excitation.
2. To control the speed of the DC motors.
3. Determine and predetermine the performance of DC machines.

The following experiments are required to be conducted compulsory experiments:

1. Magnetization characteristics of DC shunt generator. Determination of critical field resistance and critical speed.
2. Load test on DC shunt generator. Determination of characteristics.
3. Brake test on DC shunt motor. Determination of performance curves.
4. Load test on DC compound generator. Determination of characteristics.
5. Hopkinson's test on DC shunt machines. Predetermination of efficiency.
6. Fields test on DC series machines. Determination of efficiency.
7. Swinburne's test and Predetermination of efficiencies as Generator and Motor.
8. Brake test on DC compound motor. Determination of performance curves.

In addition to the above eight experiments, at least any two of the experiments from the following list are required to be conducted:

9. Load test on DC series generator. Determination of characteristics.
10. Retardation test on DC shunt motor. Determination of losses at rated speed.
11. Separation of losses in DC shunt motor.
12. Speed control of DC shunt motor by Field and armature Control.

Course Outcomes:

1. Students understand predetermine the performance of DC machines
2. Students understand control the speed of DC motor.
3. Students understand Brake test.
4. Students understand efficiency calculation on DC Shunt machine.
5. Students understand performance curves os DC compound motor.
6. Students understand Critical field resistance of DC shunt generator.

II Year -IV Semester **COURSE CODE: UR19PCEEL407**

L	T	P	C
0	0	3	1.5

ELECTRONIC DEVICES AND CIRCUITS LAB

Internal Marks: 20
External Marks: 30

PART A: Electronic Workshop Practice

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Coils, Gang Condensers, Relays, Bread Boards.
2. Identification, Specifications and Testing of active devices, Diodes, BJTs, JFETs, LEDs, LCDs, SCR, UJT.
3. Soldering Practice- Simple circuits using active and passive components.
4. Study and operation of Ammeters, Voltmeters, Transformers, Analog and Digital Multimeter, Function Generator, Regulated Power Supply and CRO.

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PART B: List of Experiments

1. P-N Junction Diode Characteristics
Part A: Germanium Diode (Forward bias& Reverse bias)
Part B: Silicon Diode (Forward Bias only)
2. Zener Diode Characteristics
Part A: V-I Characteristics
Part B: Zener Diode as Voltage Regulator
3. Rectifiers (without and with c-filter)
Part A: Half-wave Rectifier
Part B: Full-wave Rectifier
4. BJT Characteristics(CE Configuration)
Part A: Input Characteristics
Part B: Output Characteristics
5. FET Characteristics(CS Configuration)
Part A: Drain Characteristics
Part B: Transfer Characteristics
6. SCR Characteristics
7. UJT Characteristics
8. Transistor Biasing
Electrical and Electronics Engineering
9. CRO Operation and its Measurements
10. BJT-CE Amplifier
11. Emitter Follower-CC Amplifier
12. FET-CS Amplifier

II Year –IV Semester **COURSE CODE: UR19MC401**

L	T	P	C
0	0	0	0

PROFESSIONAL ETHICS AND HUMAN VALUES

Course Objectives:

- To give basic insights and inputs to the student to inculcate Human values to grow as a responsible human beings with proper personality.
- Professional Ethics instills the student to maintain ethical conduct and discharge their professional duties.

UNIT I: Human Values:
Morals, Values and Ethics – Integrity –Trustworthiness - Work Ethics – Service Learning – Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing – Honesty -Courage – Value Time – Co-operation – Commitment – Empathy – Self-confidence – Spirituality-Character.

UNIT: II: Principles for Harmony:
Truthfulness – Customs and Traditions -Value Education – Human Dignity – Human Rights – Fundamental Duties - Aspirations and Harmony (I, We & Nature) – Gender Bias – Emotional Intelligence – Salovey – Mayer Model – Emotional Competencies – Conscientiousness.

UNIT III: Engineering Ethics and Social Experimentation:
History of Ethics - Need of Engineering Ethics - Senses of Engineering Ethics- Profession and Professionalism —Self Interest - Moral Autonomy – Utilitarianism – Virtue Theory - Uses of Ethical Theories - Deontology- Types of Inquiry –Kohlberg's Theory - Gilligan's Argument – Heinz's Dilemma - Comparison with Standard Experiments — Learning from the Past – Engineers as Managers – Consultants and Leaders – Balanced Outlook on Law - Role of Codes – Codes and Experimental Nature of Engineering.

UNIT IV: Engineers' Responsibilities towards Safety and Risk:
Concept of Safety - Safety and Risk – Types of Risks – Voluntary v/sInvoluntary Risk – Consequences - Risk Assessment – Accountability – Liability - Reversible Effects – Threshold Levels of Risk - Delayed v/sImmediate Risk - Safety and the Engineer – Designing for Safety – Risk-Benefit Analysis-Accidents.

UNIT V: Engineers' Duties and Rights:
Concept of Duty - Professional Duties – Collegiality - Techniques for Achieving Collegiality – Senses of Loyalty - Consensus and Controversy - Professional and Individual Rights – Confidential and Proprietary Information - Conflict of Interest-Ethical egoism – Collective Bargaining – Confidentiality - Gifts and Bribes - Problem solving-Occupational Crimes-Industrial Espionage- Price Fixing-Whistle Blowing.

Globalization and MNCs –Cross Culture Issues - Business Ethics – Media Ethics -Environmental Ethics – Endangering Lives - Bio Ethics - Computer Ethics - War Ethics – Research Ethics - Intellectual Property Rights. Related Cases Shall be dealt where ever necessary.

References:

1. Professional Ethics by R. Subramaniam – Oxford Publications, New Delhi.

2. Ethics in Engineering by Mike W. Martin and Roland Schinzinger - Tata McGraw-Hill –2003.

3. Professional Ethics and Morals by Prof.A.R.Aryasri, DharanikotaSuyodhana – Maruthi Publications.

4. Engineering Ethics by Harris, Pritchard and Rabins, Cengage Learning, New Delhi.

5. Human Values & Professional Ethics by S. B. Gogate, Vikas Publishing House Pvt. Ltd., Noida.

6. Engineering Ethics & Human Values by M.Govindarajan, S.Natarajan and V.S. Senthil Kumar-PHI Learning Pvt. Ltd – 2009.

7. Professional Ethics and Human Values by A. Alavudeen, R.Kalil Rahman and M.Jaya kumaran – University Science Press.

8. Professional Ethics and Human Values by Prof.D.R.Kiran-Tata McGraw-Hill - 2013

9. Human Values And Professional Ethics by Jayshree Suresh and B. S. Raghavan, S.Chand Publications

COURSE OUTCOMES:

At the end of the course, the student will be able to

CO1: It gives a comprehensive understanding of a variety issues that are encountered by every professional in discharging professional duties.
CO2: It provides the student the sensitivity and global outlook in the contemporary world to fulfill the professional obligations effectively.
CO3: Understands about Need of Engineering Ethics, Profession and Professionalism and Balanced Outlook on Law
CO4: Demonstrates the risk factors and also the Designing facts for Safety.

CO5: Understand the Concepts of Duty and Problem solving-Occupational Crimes.

CO6: Understands the different ethics like Bio Ethics, Computer Ethics, War and research Ethics

Usha Rama College of Engineering and Technology

Electrical and Electronics Engineering

Course Structure (UR19)

FIRST SEMESTER (I -YEAR) **Date: 07-09-2021**

I SEMESTER								
S. No	**Course Category**	**Course Code**	**Course Name**	**L**	**T**	**P**	**Contact Hrs./wk**	**C**
1	HMC	UR19HM101	Communicative English	2	0	0	2	2
2	BSC	UR19BSC105	Linear Algebra & Calculus	3	1	0	4	4
3	BSC	UR19BSC102	Applied Physics	3	0	0	3	3
4	ESC	UR19ESC106	Fundamentals of Computer Science	3	0	0	3	3
5	ESC	UR19ESC104	Engineering Graphics & Drafting	1	0	3	4	2.5
6	BSC	UR19BSCL103	Applied Physics Lab	0	0	3	3	1.5
7	ESC	UR19ESCL102	Engineering Workshop and IT Workshop	0	0	3	3	1.5
8	HSMC	UR19HML101	Communicative English Lab	0	0	2	2	1
MANDATORY COURSE								
9	BSC	UR19BSCL104	Applied Physics-Virtual Lab*	0	0	0	2	0
			Total	12	1	11	26	18.5
*Internal evaluation								

SECOND SEMESTER (I -YEAR)

II SEMESTER								
S. No	**Course Category**	**Course Code**	**Course Name**	**L**	**T**	**P**	**Contact Hrs./wk**	**C**
1	HMC	UR19HMC202	Professional English	2	0	0	2	2
2	BSC	UR19BSC208	Differential Equations & Vector Calculus	3	0	0	3	3
3	BSC	UR19BSC204	Applied Chemistry	3	0	0	3	3
4	ESC	UR19ESC207	Problem Solving & Programming Using C	3	0	0	3	3
5	ESC	UR19BSC109	Numerical Methods and Transforms	3	0	0	3	3
6	ESC	UR19ESC209	Electrical Circuit Analysis-I	3	0	0	3	3
7	ESC	UR19ESCL201	Problem Solving & Programming Using C Lab	0	0	3	3	1.5
8	BSC	UR19BSCL206	Applied Chemistry Lab	0	0	3	3	1.5
9	HMC	UR19HML202	Professional English Lab	0	0	3	3	1.5
			MANDATORY COURSES					
10	MC	UR19MC200	Engineering Exploration Project*	0	0	0	1	0
11	MC	UR19MC203	Constitution of India	0	0	0	2	0
			Total	17	0	9	29	21.5
*Internal evaluation								

THIRD SEMESTER (II-YEAR)

III SEMESTER								
S. No	**Course Category**	**Course Code**	**Course Name**	**L**	**T**	**P**	**Contact Hrs./wk**	**C**
1	PCC	UR19PCEE301	Electrical Machines-I	3	1	0	4	4
2	PCC	UR19PCEE302	Electrical Circuit Analysis-II	3	0	0	3	3
3	PCC	UR19PCEE303	Electromagnetic Field	2	1	0	3	3
4	PCC	UR19PCEE304	Electronic Devices and Circuits	3	0	0	3	3
5	PCC	UR19PCEE305	Thermal and Hydro Prime Movers	2	0	0	2	2
6	HMC	UR19HM306	Managerial Economics and Financial Analysis	3	0	0	3	3
7	PCC	UR19PCEEL301	Electrical Circuit and Simulation Lab	0	0	3	3	1.5
8	PCC	UR19PCEEL302	Thermal and Hydro Lab	0	0	3	3	1.5
	MANDATORY COURSE							
9	MC	UR19MC301	Environmental Studies	0	0	0	2	0
Total				16	2	6	26	21
Employability Skills- I*							2	0
*Internal evaluation								

FOURTH SEMESTER (II-YEAR)

IV SEMESTER								
S. No	**Course Category**	**Course Code**	**Course Name**	**L**	**T**	**P**	**Contact Hrs./wk**	**C**
1	PCC	UR19PCEE401	Electrical Machines-II	3	1	0	4	4
2	PCC	UR19PCEE402	Power Systems-I	3	0	0	3	3
3	PCC	UR19PCEE403	Control Systems	2	1	0	3	3
4	PCC	UR19PCEE404	Switching Theory and Logic Design	2	1	0	3	3
5	PCC	UR19PCEE405	Electrical Measurements	3	0	0	3	3
6	PCC	UR19PCEEL401	Electrical Machines-I Lab	0	0	3	3	1.5
7	PCC	UR19PCEEL402	Electronic Devices and Circuits Lab	0	0	3	3	1.5
MANDATORY COURSES								
1	MC	UR19MC401	Professional Ethics and Human Values	0	0	0	2	0
2	PROJ	UR19MPROJEE401	Socially Relevant Mini Project	0	0	0	2	0
Total				14	2	6	26	19
Self Learning *(Technical Certificate)							1	0
*Internal evaluation								

FIFTH SEMESTER (III-YEAR)

V SEMESTER								
S. No	**Course Category**	**Course Code**	**Course Name**	**L**	**T**	**P**	**Contact Hrs./wk**	**C**
1	PCC	UR19PCEE501	Linear and Digital IC Applications	3	0	0	3	3
2	PCC	UR19PCEE502	Power Systems-II	3	0	0	3	3
3	PCC	UR19PCEE503	Power Electronics	3	0	0	3	3
4	PCC	UR19PCEE504	Signals and Systems	3	0	0	3	3
Professional Elective – I								
5	PEC	UR19PEEE501	Industrial Drives and Application	3	0	0	3	3
		UR19PEEE502	Data Base Management System					
		UR19PEEE503	Renewable Energy sources					
		UR19PEEE504	Communication Systems					
		UR19PEEE505	Computer Networks					
6	PCC	UR19PCEEL501	Electrical Machines-II Lab	0	0	3	3	1.5
7	PCC	UR19PCEEL502	Electrical Measurements Lab	0	0	3	3	1.5
8	PCC	UR19PCEEL503	Control Systems Lab	0	0	3	3	1.5
MANDATORY COURSE								
9	MC	UR19MCEEL501	Virtual Electrical Machines Lab*	0	0	2	2	0
			Total	15	0	9	26	19.5
Employability Skills- II*							2	0
Self Learning *(Technical Certificate)							2	0
*Internal evaluation								

SIXTH SEMESTER (III-YEAR)

VI SEMESTER								
S. No	**Course Category**	**Course Code**	**Course Name**	**L**	**T**	**P**	**Contact Hrs./wk**	**C**
1	PCC	UR19PCEE601	Power Systems Analysis	3	0	0	3	3
2	HMC	UR19HM 602	Management Science	3	0	0	3	3
3	PCC	UR19PCEE603	Electrical Drives	3	0	0	3	3
4	PCC	UR19PCEE604	Microprocessors and Microcontrollers	3	0	0	3	3
Professional Elective – II								
5	PEC	UR19PEEE601	Design of Electrical Apparatus	3	0	0	3	3
		UR19PEEE602	Electric Machine design					
		UR19PEEE603	Electrical Materials					
		UR19PEEE604	IOT applications to Electrical Engineering					
		UR19PEEE605	Digital Signal Processing					
6	OEC		**Open Elective-I**	3	0	0	3	3
7	PCC	UR19PCEEL601	Power Electronics Lab	0	0	3	3	1.5
8	PCC	UR19PCEEL602	Microprocessors and Microcontrollers Lab	0	0	3	3	1.5
MANDATORY COURSES								
9	MC	UR19MC601	Essence of Indian Traditional Knowledge	0	0	0	2	0
10	ESC	UR19ESCL610	Virtual Power Lab*	0	0	2	2	0
12	PROJ	UR19MPROJEE 611	Socially Relevant Mini Project	0	0	0	2	0
			Total	18	0	6	30	21
*Internal evaluation								

SEVENTH SEMESTER (IV-YEAR)

VII SEMESTER								
S. No	**Course Category**	**Course Code**	**Course Name**	**L**	**T**	**P**	**Contact Hrs./wk**	**C**
1	PCC	UR19PCEE701	Switch Gear and Protection	3	0	0	3	3
2	PCC	UR19PCEE702	Utilization of Electrical Energy	3	0	0	3	3
Professional Elective – III								
3	PEC	UR19PEEE701	Digital Control Systems	3	0	0	3	3
		UR19PEEE702	Electrical and Electronics Instrumentation					
		UR19PEEE703	Electrical Distribution System					
		UR19PEEE704	VLSI Design					
		UR19PEEE705	Cloud Computing					
Professional Elective – IV								
4	PEC	UR19PEEE706	Advanced Control Systems	3	0	0	3	3
		UR19PEEE707	Special Electrical Machines					
		UR19PEEE708	HVDC & EHV AC Transmission System					
		UR19PEEE709	Operating Systems					
		UR19PEEE710	Smart Grid					
5	OEC		**Open Elective – II**	3	0	0	3	3
7	PCC	UR19PCEEL701	Power Systems Lab	0	0	3	3	1.5
8	PCC	UR19PCEEL702	Electrical Simulation Lab	0	0	3	3	1.5
10	PROJ	UR19PROJEE711	Internship	0	0	0	0	2
11	PROJ	UR19PROJEE712	Project Stage-I (Literature Survey, Problem Identification)	0	0	3	0	1.5
			Total	15	0	9	21	21.5

EIGHT SEMESTER (IV-YEAR)

VIII SEMESTER								
S. No	**Course Category**	**Course Code**	**Course Name**	**L**	**T**	**P**	**Contact Hrs./wk**	**C**
1	PCC	UR19PCEE801	Power System Operation and Control	3	0	0	3	3
Professional Elective – V								
2	PEC	UR19PEEE801	FACTS	3	0	0	3	3
		UR19PEEE802	Power System Deregulation					
		UR19PEEE803	High Voltage Engineering					
		UR19PEEE804	Data Analytics with Python					
		UR19PEEE805	Power Quality					
3	OEC		**Open Elective – III**	3	0	0	3	3
4	PROJ	UR19PROJEE801	Project Stage-II	0	0	18	18	9
							Total	18

Total Credits = 18.5+21.5+21+19+19.5+21+21.5+18=160

List of Open Electives

Open Electives offered by the Dept. of CE

S.No.	Course Code	Open Elective-I
1	UR19OECE 601	Introduction To GIS
2	UR19OECE 602	Environmental Pollution Control
3	UR19OECE603	Conservation of Water Resources
	Course Code	**Open Elective-II**
3	UR19 OECE 701	Metro Systems and Engineering
4	UR19 OECE 702	Natural Disaster Mitigation and Management
5	UR19OECE 703	Total Quality Management
	Course Code	**Open Elective-III**
6	UR19 OECE 801	Sanitary and Public Health Engineering
7	UR19 OECE 802	Environmental and Industrial Hygiene
8	UR19OECE803	Green Buildings

Open Electives offered by the Dept. of EEE

S.No.	Course Code	Open Elective-I
1	UR19OEEE601	Neural Networks and Fuzzy Logic
2	UR19OEEE602	Linear Control Systems
3	UR19OEEE603	Electrical Safety Management
	Course Code	**Open Elective – II**
4	UR19OEEE701	Programmable Logic Controllers
5	UR19OEEE702	Energy Audit and Conservation Management
6	UR19OEEE703	Electrical Technology
	Course Code	**Open Elective – III**
7	UR19OEEE801	Non Conventional Energy Sources
8	UR19OEEE802	Industrial Electrical Operation
9	UR19OEEE803	Hybrid Electric Vehicles

Open Electives offered by the Dept. of ME

S.No.	Course Code	Open Elective-I
1	UR19OEME601	Nano Technology
2	UR19OEME602	Robotics
3	UR19OEME603	Power Plant Engineering
	Course Code	**Open Elective-II**
4	UR19OEME701	Operations Research
5	UR19OEME702	Industrial Engineering & Quality control
6	UR19-OEME703	Advanced materials
	Course Code	**Open Elective-III**
7	UR19OEME801	Optimization Techniques
8	UR19OEME802	Green Engineering systems
9	UR19OEME803	Mechatronics

Open Electives offered by the Dept. of ECE

S.No.	Course Code	Open Elective-I
1	UR19OEEC 601	Consumer Electronics
2	UR19OEEC 602	Digital Electronics
3	UR19OEEC603	Analog and Digital I.C. Applications
	Course Code	**Open Elective-II**
4	UR19OEEC 701	Embedded Systems
5	UR19OEEC 702	Internet of Things (IoT)
6	UR19OEEC703	Principles of Computer Communications and Networks
	Course Code	**Open Elective-III**
7	UR19OEEC 801	Microcontrollers
8	UR19OEEC 802	Principles of Electronic Communications
9	UR19OEEC803	Electronic Measurements and Instrumentation

Open Electives offered by the Dept. of CSE

S.No.	Course Code	Open Elective-I
1	UR19OECS601	Python Programming
2	UR19OECS602	Data Base Management Systems
3	UR19OECS603	C++ Programming
	Course Code	**Open Elective-II**
4	UR19OECS701	Distributed Computing
5	UR19OECS702	Java Programming
6	UR19OECS703	Big Data
	Course Code	**Open Elective-III**
7	UR19OECS801	Digital Forensics
8	UR19OECS802	Deep Learning
9	UR19OECS803	AI and ML for Robotics

Open Electives offered by the Dept. of IT

S.No.	Course Code	Open Elective-I
1	UR19OEIT101	Data Structures
2	UR19OEIT102	Computer Graphics
3	UR19OEIT103	Data Science
	Course Code	**Open Elective – II**
4	UR19OEIT201	Operating Systems
5	UR19OEIT202	Python Programming
6	UR19OEIT203	Web Technologies
	Course Code	**Open Elective – III**
7	UR19OEIT301	Information Security Management
8	UR19OEIT302	Mobile Application Development
9	UR19OEIT303	Block Chain Technologies

III Year- I Semester **COURSE CODE: UR19PCEE501** **L T P C**
3 0 0 3

LINEAR & DIGITAL IC APPLICATIONS

Internal Marks: 30
External Marks: 70

Course Objectives:
After completion of this course, the reader should be able to

1. Draw a block diagram representing a typical op-amp with various definitions.
2. Draw and explain the open-loop configuration and feedback configuration and can determine Voltage gain, the input resistance, the output resistance.
3. Differentiate between Ideal and Non-Ideal Op-Amp, Determination of closed loop voltage gain, the input resistance, the output resistance for Non-Ideal Op-Amp Circuits.
4. Perform various mathematical Operations, Trigonometric & Logarithmic Operations, and Instrumentation Amplifier with relevant Circuits.
5. Design waveform generators (Astable, Monostable, Schmitt Trigger) using Single Op-Amp.
6. Study of 555 timer & its applications using Astable and Monostable Operations. Can design various types of Active Filters such as LPF, HPF, BPF, BRF, NBPF, Notch Filter, ALL pass filters.

UNIT–I:
Introduction To Operational Amplifier
Block diagram of Typical Op–Amp With Various Stages– BJT Differential Amplifier With RE DC Analysis– AC Analysis –BJT differential amplifier with constant current source – Analysis Different input/output configurations dual input balanced output–Signal input balanced output– AC analysis with r– parameters –Current repeater circuits–Current mirror circuits.

UNIT–II:
OP–AMP Parameter
Input offset voltage – Input off–set current–Input bias current–Differential input resistance– Common mode rejection ratio–Slew ratio–PSRR–definitions and explanations. Measurement of bias current–Measurement of offset currents– Measurement of offset voltage –Measurement of slew rate –Bias current compensations circuit–Dual power suppliers with shunt capacitance filter..

UNIT–III
Ideal Operational Amplifier Theory and Basic Circuits
Ideal operational amplifier properties–Ideal assumptions–Basic circuits such as non inverting type comparator–Inverting type comparator–Voltage follower– sub-tractor– Differentiator– Integrator– Scale changer–Instrumentation amplifier– V to I and I to V convertors—Schmitt-trigger peak detector– Half-wave and full-wave rectifiers.

UNIT–IV:

Wave form generator in angular waveform generator using op–amps and PLL Design of Astable multivibrator –Monostable multivibrator using signal op-amp– Trigring waveform generator 555 timer**:**Introduction– Pindiagram–Functional diagram for 8pin DIP–Astable application –Monostable applications– PLL**:** Introduction,basic blockdiagram– Furctions of each block–566 VC0– 565 PLL block diagram –Function of each block– Applications of PLL.

UNIT–V:

Active filters

Introduction– Merits and demerits of active filters–Over passive filters– First order low pass Butter–Worth filter –LPF – HPF- First and Second order– Higher-order filters– BPF wide band– pass and narrow band–pass filter–Wide band reject filter–Notch filter–All-pass filter.

Digital to Analog Convertors

Digital to Analog Convertors(D to A) – Introduction–Specifications–Basic DAC techniques– Weighted resistor DAC– R–2R ladder DAC–Invested R– 2R –Output expression for each type.

Analog to Digital Convertors

Introduction–Specifications–Parallel comparator type–Counter type–Dual slope–Successive approximation type ADCs– Merits and demerits of each type, Comparison of different types.

Text Books:

1. OP–AMPS and liner integrator circuits by Ramakanth A Gayakwad (PHI).
2. Linear Integrated Circuits by D.Roy chowdary, New age international.
3. Op–amp and linear integrated circuits by sanjay sharma, S.K.Kataria & son's New Delhi.

Reference Books:

1. Micro Electronics– Mclliman Mc Graw Hill.
2. Analog Electronics– L.K.Maheswari, PHI.
3. Linear Integrated circuits by S.Salivahan, TMH.

Course Outcomes:

After completion of this course student can able to

1. Differentiate "Analog Circuits & Digital Circuits".
2. Design the "Linear Circuits" with their own innovative skills.
3. Exhibit his logical skills & Analytical ability.
4. Design their own circuits which may be useful for current industry needs.
5. Study the operation & applications of PLA.
6. Know operation of A/D and D/A Converters.

III Year- I Semester **COURSE CODE: UR19PCEE502** **L T P C**
3 0 0 3

POWER SYSTEMS-II

Internal Marks: 30
External Marks: 70

Course Objectives:

1. To compute inductance and capacitance of transmission lines and to understand the concepts of GMD, GMR.
2. To study short and medium length transmission lines, their models and performance computation.
3. To study the performance and modeling of long transmission lines.
4. To study the transient on transmission lines.
5. To study the factors affecting the performance of transmission lines and power factor improvement methods.
6. To discuss sag and tension computation of transmission lines as well as to study the over head insulators.

UNIT–I:
Transmission Line Parameters
Types of conductors – Calculation of resistance for solid conductors – Calculation of inductance for single phase and three phase– Concept of GMR and GMD–Symmetrical and asymmetrical conductor configuration with and without transposition– Numerical Problems–Calculation of capacitance for 2 wire and 3 wire systems – Effect of ground on capacitance – Capacitance calculations for symmetrical and asymmetrical–Single and double circuit lines–Numerical Problems.

UNIT–II:
Performance of Short and Medium Length Transmission Lines
Classification of Transmission Lines – Short, medium, long line and their model representations –Nominal-T–Nominal-Pie and A, B, C, D Constants for symmetrical and Asymmetrical Networks– Numerical Problems– Mathematical Solutions to estimate regulation and efficiency of all types of lines – Numerical Problems.

UNIT–III:
Performance of Long Transmission Lines
Long Transmission Line–Rigorous Solution – Evaluation of A,B,C,D Constants–Interpretation of the Long Line Equations – Incident, Reflected and Refracted Waves –Surge Impedance and SIL – Representation of Long Lines – Equivalent-T and Equivalent Pie network models (Numerical Problems).

UNIT – IV:
Power System Transients
Types of System Transients – Attenuation–Distortion – Reflection and Refraction Coefficients.

Various Factors Governing the Performance of Transmission line

Skin and Proximity effects –Ferranti effect – Charging Current – Effect on Regulation of the Transmission Line–Shunt Compensation –Corona – Description of the phenomenon–Factors affecting corona– Radio Interference –Power factor improvement methods- Numerical Problems.

UNIT–V:

Sag and Tension Calculations and Overhead Line Insulators

Sag and Tension calculations with equal and unequal heights of towers– Effect of Wind and Ice on weight of Conductor–Stringing chart and sag template and its applications–Types of Insulators – String efficiency and Methods for improvement–Numerical Problems – Voltage distribution–Calculation of string efficiency.

Text Books:

1. Electrical power systems – by C.L. Wadhwa, New Age International (P) Limited, Publishers, 1998.
2. Modern Power System Analysis by I.J. Nagarath and D.P.Kothari, Tata Mc Graw Hill, 2nd Edition.
3. Electrical Power Systems by P.S.R. Murthy, B.S. Publications.

Reference Books:

1. Power system Analysis–by John J Grainger William D Stevenson, TMC Companies, 4th edition
2. Power System Analysis and Design by B.R. Gupta, Wheeler Publishing.
3. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S. Bhatnagar A .Chakrabarthy, DhanpatRai & Co Pvt. Ltd.

Course Outcomes:

1. Students able to understand parameters of various types of transmission lines for using calculation and behavior during different operating conditions.
2. Student understand parameters of various types of transmission lines for using calculation and behavior during different operating conditions.
3. Students understand the insight into specific transmission lines short and medium type would have application in medium and high voltage power transmission systems.
4. Student will be able to understand the surge propagation, reflection and refraction in transmission lines. Such output will be useful in protecting transmission line insulators and designing level of insulation coordination at various high voltages.
5. Students will be able to utilize it for understanding the surge behavior of transmission line for protection of connects equipments, viz. power transformer and system connected shunt reactors.
6. Students able to understand physical and geometrical parameters of transmission line for safe and efficient performance during operating condition of voltage and power.

III Year- I Semester **COURSE CODE: UR19PCEE503** **L T P C**
3 0 0 3

POWER ELECTRONICS

Internal Marks: 30
External Marks: 70

Course Objectives:

1. To study the characteristics of various power semiconductor devices and to design firing circuits for SCR.
2. To understand the operation of single phase full–wave converters and analyze harmonics in the input current.
3. To study the operation of three phase full–wave converters.
4. To understand the operation of different types of DC-DC converters.
5. To understand the operation of inverters and application of PWM techniques for voltage control and harmonic mitigation.
6. To analyze the operation of AC-AC regulators.

UNIT–I:

Power Semi-Conductor Devices

Thyristors–Silicon controlled rectifiers (SCR's) –Basic theory of operation of SCR–Static characteristics– Turn on and turn off\ methods–Dynamic characteristics of SCR– Static V-I characteristics of TRIAC and modes of operation-Characteristics of power MOSFET and power IGBT– Snubber circuit design–.

UNIT–II:

AC-DC Single-Phase Converters

Single phase diode bridge rectifier with capacitor filter -1-phase half wave controlled rectifiers – R load and RL load with and without freewheeling diode – 1-phase full wave controlled rectifiers (single phase fully controlled rectifier and single phase semi controlled rectifier) – bridge configuration – analysis with R load and RL load– continuous and discontinuous conduction.

UNIT–III:

AC-DC 3-Phase Converters

3-phase half wave and Full wave uncontrolled rectifier – 3-phase half wave controlled rectifier with R and RL load – 3-phase fully controlled rectifier with R and RL load – 3-phase semi controlled rectifier with R and RL load.

UNIT–IV:

DC–DC Converters

Analysis of Buck, boost and buck, buck-boost converters in Continuous Conduction Mode (CCM) and Discontinuous Conduction Modes (DCM) – Output voltage equations using volt-sec balance in CCM & DCM –design consideration of DC-DC converters in continuous conduction mode.

UNIT – V:

DC–AC Converters

Single phase full bridge inverters with R and RL loads – bipolar and unipolar PWM techniques- 3-phase square wave inverters – 120^0 conduction and 180^0 conduction modes of operation – PWM inverters – Quasi-square wave PWM – Sinusoidal pulse width modulation –third harmonic PWM- Space vector PWM.

AC – AC Regulators.

1-phase AC-AC regulator phase angle control with R and RL load – For continuous and discontinuous conduction- 3-Phase AC-AC regulators with R load .

Text Books:

1. Power Electronics: Circuits, Devices and Applications – by M. H. Rashid, Prentice Hall of India, 2nd edition, 1998
2. Power Electronics: Essentials & Applications by L.Umanand, Wiley, Pvt. Limited, India, 2009

.**Reference Books:**

1. Elements of Power Electronics–Philip T.Krein.oxford.
2. Power Electronics – by P.S.Bhimbra, Khanna Publishers.
3. Thyristorised Power Controllers – by G. K. Dubey, S. R. Doradla, A. Joshi and R. M. K.Sinha, New Age International (P) Limited Publishers, 1996.
4. Power Electronics: converters, applications & design -by Nedmohan, Tore M. Undeland, Robbins by Wiley India Pvt. Ltd.
5. Power Converter Circuits -by William Shepherd, Li zhang, CRC Taylor & Francis Group.

Course Outcomes:

Student should be able to

1. Explain the characteristics of various power semiconductor devices and analyze the static and dynamic characteristics of SCR's.
2. Design firing circuits for SCR.
3. Explain the operation of single phase full–wave converters and analyze harmonics in the input current.
4. Explain the operation of three phase full–wave converters.
5. Analyze the operation of different types of DC-DC converters.
6. Explain the operation of inverters and application of PWM techniques for voltage control and harmonic mitigation. Analyze the operation of AC-AC regulators.

III Year- I Semester **COURSE CODE: UR19PCEE505** **L T P C**
3 0 0 3

SIGNALS & SYSTEMS

Internal Marks: 30
External Marks: 70

Course Objectives:
The main objectives of this course are given below:

1. To introduce the terminology of signals and systems.
2. To introduce Fourier tools through the analogy between vectors and signals.
3. To introduce the concept of sampling and reconstruction of signals.
4. To analyze the linear systems in time and frequency domains.
5. To study z-transform as mathematical tool to analyze discrete-time signals and systems.

UNIT- I: INTRODUCTION:
Definition of Signals and Systems, Classification of Signals, Classification of Systems, Operations on signals: time-shifting, time-scaling, amplitude-shifting, amplitude-scaling. Problems on classification and characteristics of Signals and Systems. Complex exponential and sinusoidal signals, Singularity functions and related functions: impulse function, step function signum function and ramp function.

UNIT –II: FOURIER SERIES AND FOURIER TRANSFORM:
Fourier series representation of continuous time periodic signals, properties of Fourier series, Dirichlet's conditions. Deriving Fourier transform from Fourier series, Fourier transform of arbitrary signal, Fourier transform of standard signals, Fourier transform of periodic signals, properties of Fourier transforms, Fourier transforms involving impulse function and Signum function. Application of Fourier series and Fourier transforms.

UNIT –III: SAMPLING THEOREM:
Graphical and analytical proof for Band Limited Signals, impulse sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, effect of under sampling.

UNIT-IV: ANALYSIS OF LINEAR SYSTEMS:
Linear system, impulse response, Response of a linear system, Linear time invariant (LTI) system, Linear time variant (LTV) system, Concept of convolution in time domain and frequency domain, Transfer function of a LTI system. Filter characteristics of linear systems. Signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics,

Energy density spectrum, Parseval's theorem, Power density spectrum, Relation between auto correlation function and energy/power spectral density function. Extraction of signal from noise by filtering.

UNIT –V: LAPLACE TRANSFORMS :

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

Z–TRANSFORMS :

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

TEXT BOOKS:

1. Principles of Linear Systems and Signals – BP Lathi, Oxford University Press, 2015
2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI, 2nd Edn.

REFERENCE BOOKS:

1. Signals & Systems - Simon Haykin and Van Veen, Wiley, 2nd Edition.
2. Signals and Systems – K Raja Rajeswari, B VisweswaraRao, PHI, 2009
3. Fundamentals of Signals and Systems- Michel J. Robert, MGH International Edition, 2008.
4. Signals and Systems – T K Rawat , Oxford University press, 2011

Course Outcomes:

Students will be able to

1. Characterize the signals and systems and principles of vector spaces, Concept of orthgonality.
2. Analyze the continuous-time signals and continuous-time systems using Fourier series, Fourier transform and Laplace transform.
3. Apply sampling theorem to convert continuous-time signals to discrete-time signal and reconstruct back.
4. Understand the relationships among the various representations of LTI systems
5. Understand the Concepts of convolution, correlation, Energy and Power density spectrum and their relationships.
6. Apply z-transform to analyze discrete-time signals and systems.

III Year- I Semester **COURSE CODE: UR19PEEE501** **L T P C**
3 0 0 3

INDUSTRIAL DRIVES AND APPLICATIONS
(Professional Elective-I)

Internal Marks: 30
External Marks: 70

Course Objectives:

1. Electrical drives play an important part as electromechanical energy converters in transportation, materials handling and most production processes.
2. The course tries to give unified treatment of complete electrical drive systems, including the mechanical parts, electrical machines, and power converters and control.

UNIT I:

Introduction: Definition of electric drive, type of drives; Speed torque characteristic of driven unit/loads, motors, joint speed-torque characteristic; Classification and components of load torque;

UNIT II:

Generalized theory and Kron's primitive machine model, Modeling of dc machines, Modeling of induction machine, Modeling of synchronous machine, Reference frame theory and per unit system

UNIT III:

Control of Induction Motor Drive, Scalar control of induction motor, Principle of vector control and field orientation, Direct torque and flux control of induction motor , Mutilevel converter-fed induction motor drive, Utility friendly induction motor drive.

UNIT IV:

Control of Synchronous Motor, Self controlled synchronous motor, Vector control of synchronous motor, Cycloconverter-fed synchronous motor drive, Control of synchronous reluctance motor

UNIT V:

Control of Special Electric Machines, Permanent magnet synchronous motor, Brushless dc motor Switched reluctance motor, Stepper motors and control, Industrial drives. Harmonic reduction techniques, PWM inverters, Space Vector Modulation.

Text Books:

1. Mohan N., Underland T.M. and Robbins W.P., “Power Electronics –Converters, Applications and Design”, 3rd Ed., Wiley India. 2008.

2. Bose B.K., “Power Electronics and Variable Frequency Drives –Technology and Applications”, IEEE Press, Standard Publisher Distributors. 2001

Reference Books:

1.B.K.Bose, Power Electronics & A.C. Drives, Prentice Hall, 1986

2.Rashid M., “Power Electronics- Circuits, Devices and Applications”, 3rd Ed., Pearson Education.

3. Dubey G. K., “Power Semiconductor Controlled Drives”, Prentice Hall International Edition. 1989

4. Murphy J. M. D. and Turnbull F. G., “Power Electronics Control of AC Motors”, Peragmon Press. G.K.Dubey, Fundamentals of Electric Drives.

Course Outcomes:

1. Students will be able to understand drives.
2. Students will be able design a machines.
3. Students will be able to understand various control drive.
4. Students will be able to understand power electronic control.
5. Students will be able to understand operation of special motors.
6. Students will be able to understand control special motors.

III Year- I Semester **COURSE CODE: UR19PEEE502** **L T P C**
3 0 0 3

DATA BASE MANAGEMENT SYSTEM
(Professional Elective-I)

Internal Marks: 30
External Marks: 70

Objectives:
1.To Understand the basic concepts and the applications of database systems
2.To Master the basics of SQL and construct queries using SQL
3.To understand the relational database design principles
4.To become familiar with the basic issues of transaction processing and concurrency control
5.To become familiar with database storage structures and access techniques

UNIT-I:
An Overview of Database Management, Introduction- What is Database System- What is Database-Why Database- Data Independence- Relation Systems and Others- Summary, **Database system architecture, Introduction-** The Three Levels of Architecture-The External Level- the Conceptual Level- the Internal Level- Mapping- the Database Administrator-The Database Management Systems- Client/Server Architecture.

UNIT-II:
The E/R Models, The Relational Model, Relational Calculus, Introduction to Database Design, Database Design and Er Diagrams-Entities Attributes, and Entity Sets-Relationship and Relationship Sets-Conceptual Design With the Er Models, The Relational Model Integrity Constraints Over Relations- Key Constraints –Foreign Key Constraints-General Constraints, Relational Algebra and Calculus, Relational Algebra- Selection and Projection- More Examples of Queries.

UNIT-III:
Queries, Constraints, Triggers: The Form of Basic SQL Query, Union, Intersect, and Except, Nested Queries, Aggregate Operators, Null Values, Complex Integrity Constraints in SQL, Triggers and Active Database.

UNIT-IV:
Schema Refinement (Normalization) : Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency(1NF, 2NF and 3 NF), concept of surrogate key, Boyce-codd normal form(BCNF), Fourth normal form(4NF).

UNIT-V:
Transaction Management and Concurrency Control:
Transaction, properties of transactions, transaction log, and transaction management with SQL using commit rollback and save point. Concurrency control for lost updates, uncommitted data. Concurrency control with locking methods: lock granularity, lock types, two phase locking for

ensuring serializability, deadlocks, Concurrency control with time stamp ordering: Wait/Die and Wound/Wait Schemes, Database Recovery management.

TEXT BOOKS:

1. Introduction to Database Systems, CJ Date, Pearson
2. Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, TATA McGraw Hill 3rd Edition
3.Database Systems - The Complete Book, H G Molina, J D Ullman, J Widom Pearson

REFERENCES BOOKS:

1. Data base Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, Elmasri Navrate Pearson Education

Course Outcomes:

Students will be able to

1. Describe a relational database and object-oriented database.
2. Create, maintain and manipulate a relational database using SQL
3. Describe ER model and normalization f or database design.
4. Examine issues in data storage and query processing and can formulate appropriate solutions.
5. Understand the role and issues in management of data such as efficiency, privacy, security, ethical responsibility, and strategic advantage.
6. Design and build database system for a given real world problem

III Year- I Semester **COURSE CODE: UR19PEEE503** **L T P C**
3 0 0 3

RENEWABLE ENERGY SOURCES
(Professional Elective-I)

Internal Marks: 30
External Marks: 70

Course Objectives:

1. To study the solar radiation data, extraterrestrial radiation, radiation on earth's surface.
2. To study solar thermal collections.
3. To study solar photo voltaic systems.
4. To study maximum power point techniques in solar PV and wind energy.
5. To study wind energy conversion systems, Betz coefficient, tip speed ratio.
6. To study basic principle and working of hydro, tidal, biomass, fuel cell and geo thermal systems.

UNIT–I: Fundamentals of Energy Systems and Solar energy Energy conservation principle – Energy scenario (world and India) – energy audit-cost of energy-Various forms of renewable energy - Solar radiation: Outside earth's atmosphere – Earth surface – Analysis of solar radiation data – Geometry – Radiation on tilted surfaces – Numerical problems.

UNIT–II: Solar Thermal Systems Liquid flat plate collectors: Performance analysis – Transmissivity– Absorptivity product collector efficiency factor – Collector heat removal factor – Numerical problems. Introduction to solar air heaters – Concentrating collectors, solar pond and solar still – solar thermal plants.

UNIT–III: Solar Photovoltaic Systems Solar photovoltaic cell, module, array – construction – Efficiency of solar cells – Developing technologies – Cell I-V characteristics – Equivalent circuit of solar cell – Series resistance – Shunt resistance – Applications and systems – Balance of system components - System design: storage sizing – PV system sizing – Maximum power point techniques: Perturb and observe (P&O) technique – Hill climbing technique-design of solar panels

UNIT–IV: Wind Energy Sources of wind energy - Wind patterns – Types of turbines – Horizontal axis and vertical axis machines - wind power – Betz limit – Tip–speed ratio – Efficiency – Power output of wind turbine – Selection of generator(synchronous, induction) – Speed drives– Maximum power point tracking – wind farms – Power generation for utility grids.

UNIT–V: Hydro, Biomass and Fuel Cell

Basic working principle – Classification of hydro systems: Large, small, micro – measurement of head and flow – Energy equation – Types of turbines – Numerical problems.

Biomass Energy: Photosynthesis and origin of biomass-biomass resources- Fuel classification – Pyrolysis – Direct combustion of heat – Different digesters and sizing.

Fuel cell: Classification of fuel for fuel cells – Fuel cell voltage– Efficiency – V-I characteristics

TEXT BOOKS:

1. Solar Energy: Principles of Thermal Collection and Storage, S. P. Sukhatme and J. K. Nayak, TMH, New Delhi, 3rd Edition.
2. Renewable Energy Resources, John Twidell and Tony Weir, Taylor and Francis .

REFERENCE BOOKS:

1. Energy Science: Principles, Technologies and Impacts, John Andrews and Nick Jelly, Oxford University Press.
2. Renewable Energy- Edited by Godfrey Boyle-oxford university.press,3rd edition,2013.
3. Handbook of renewable technology Ahmed and Zobaa, Ramesh C Bansal, World scientific.
4. Renewable Energy Technologies / Ramesh & Kumar /Narosa.
5. Renewable energy technologies – A practical guide for beginners – Chetong Singh Solanki, PHI publications.

Course Outcomes:

Student will be able to

1. Analyze solar radiation data, extraterrestrial radiation, and radiation on earth's surface.
2. Design solar thermal collectors, solar thermal plants.
3. Design solar photo voltaic systems.
4. Develop maximum power point techniques in solar PV and wind energy systems.
5. Understand wind energy conversion systems, wind generators, power generation.
6. Understand basic principle and working of hydro, tidal, biomass, fuel cell and geothermal systems.

III Year- I Semester **COURSE CODE: UR19PEE504**

L	T	P	C
3	0	0	3

COMMUNICATION SYSTEMS
(Professional Elective-I)

Internal Marks: 30
External Marks: 70

Course Objectives:
1. To make students understand different types of communication.
2. To make students understand different modulation technique.
3. To make students understand basics of wireless communications.
4. To make students understand basics of cellular communications.

UNIT-I
Introduction: Block diagram of Electrical communication system, Radio communication, Types of communications: Analog, pulse and digital.
Analog Modulation: Need for modulation, Types of Analog modulation, Amplitude Modulation, Angle Modulation: Frequency & Phase modulations. Generation and Demodulation techniques.Advantages of FM over AM, Bandwidth consideration, Narrow band and Wide band FM, Comparison of FM & PM.

UNIT-II
Pulse Modulations: Sampling, Nyquist rate of sampling, Sampling theorem for Band limited signals, PAM, regeneration of base band signal, PWM and PPM, Time Division Multiplexing, Frequency Division Multiplexing, Asynchronous Multiplexing.

UNIT- III
Digital Communication: Advantages, Block diagram of PCM, Quantization, effect of quantization, quantization error, Base band digital signal, DM, ADM, ADPCM and comparison. Digital Modulation: ASK, FSK, PSK, DPSK, QPSK demodulation, offset and non-offset QPSK, coherent and incoherent reception, Modems.
Introduction to Wireless Networking: Introduction, Difference between wireless and fixed telephone networks, Development of wireless networks, Traffic routing in wireless networks.

UNIT- IV
Cellular Mobile Radio Systems: Introduction to Cellular Mobile System, concept of frequency reuse, Performance criteria, uniqueness of mobile radio environment, operation of cellular systems, Hexagonal shaped cells, Analog and Digital Cellular systems. Cell splitting.

UNIT- V

Handoffs and Dropped Calls: Handoff, dropped calls and cell splitting, types of handoff, handoff initiation, delaying handoff, forced handoff, mobile assisted handoff, Intersystem handoff, micro cells, vehicle locating methods, dropped call rates and their evaluation.

TEXT BOOKS

1. Communication Systems Analog and Digital – R.P. Singh and SD Sapre, TMH, 20th reprint, 2004.
2. Wireless Communications, Principles, Practice – Theodore, S. Rappaport, 2nd Ed., 2002,PHI.

REFERENCE BOOKS

1. Wireless Communication and Networking – William Stallings, 2003, PHI.
2. Electronic Communication Systems – Kennedy and Davis, TMH, 4th edition, 2004.
3. Communication Systems Engineering – John. G. Proakis and MasoudSalehi, PHI, 2ndEd. 2004.

Course Outcomes:

Student will be able to

1. Learn the basic concepts of Communication Systems.
2. Understand the concept of Pulse Modulation.
3. Acquire the knowledge of Digital Communications.
4. Learn the basic concept of Wireless Networking.
5. Understand the fundamental concept of Cellular Mobile Radio Systems.
6. Learn the concepts of Handoffs and Dropped Calls.

III Year I Semester **COURSE CODE: UR19PEEE505** **L T P C**
3 0 0 3

COMPUTER NETWORKS

(Professional Elective-I)

Internal Marks: 30
External Marks: 70

OBJECTIVES:
1.Understand state-of-the-art in network protocols, architectures, and applications.
2. Process of networking research
3. Constraints and thought processes for networking research
4. Problem Formulation Approach Analysis.

UNIT – I:
Introduction: Network Topologies WAN, LAN, MAN. Reference models- The OSI Reference Model- the TCP/IP Reference Model - A Comparison of the OSI and TCP/IP Reference Models.

UNIT – II:
Physical Layer – Fourier Analysis – Bandwidth Limited Signals – The Maximum Data Rate of a Channel - Guided Transmission Media, Digital Modulation and Multiplexing: Frequency Division Multiplexing, Time Division Multiplexing, Code Division Multiplexing
Data Link Layer Design Issues, Error Detection and Correction, Elementary Data Link Protocols, Sliding Window Protocols.

UNIT – III:
The Data Link Layer - Services Provided to the Network Layer – Framing – Error Control – Flow Control, Error Detection and Correction – Error-Correcting Codes – Error Detecting Codes, Elementary Data Link Protocols- A Utopian Simplex Protocol-A Simplex Stop and Wait Protocol for an Error free channel-A Simplex Stop and Wait Protocol for a Noisy Channel, Sliding Window Protocols.

UNIT – IV:
The Medium Access Control Sublayer-The Channel Allocation Problem-Static Channel Allocation-Assumptions for Dynamic Channel Allocation, Multiple Access Protocols-Aloha-Carrier Sense Multiple Access Protocols-Collision-Free Protocols-Limited Contention Protocols-Wireless LAN Protocols, Ethernet-Classic Ethernet Physical Layer-Classic Ethernet MAC Sublayer Protocol-Ethernet Performance-Fast Ethernet Gigabit Ethernet-10-Gigabit Ethernet-Retrospective on Ethernet, Wireless Lans.

UNIT – V:
Design Issues-The Network Layer Design Issues – Store and Forward Packet Switching-Services Provided to the Transport layer- Implementation of Connectionless Service-Implementation of

Connection Oriented Service-Comparison of Virtual Circuit and Datagram Networks, Routing Algorithms.

TEXT BOOKS:

1. Tanenbaum and David J Wetherall, Computer Networks, 5th Edition, Pearson Edu, 2010
2. Computer Networks: A Top Down Approach, Behrouz A. Forouzan, FirouzMosharraf, McGraw Hill Education

REFERENCE BOOK:

1. Larry L. Peterson and Bruce S. Davie, "Computer Networks - A Systems Approach" (5th ed), Morgan Kaufmann/ Elsevier, 2011

Course Outcomes:

Upon completion of the course the student will be able to
1. Understand OSI and TCP/IP models
2. Analyze MAC layer protocols and LAN technologies
3. Design applications using internet protocols
4. Understand routing and congestion control algorithms
5. Understand how internet works
6. Understand connection services.

III Year- I Semester **COURSE CODE: UR19PCEEL501** **L T P C**
0 0 3 1.5

ELECTRICAL MACHINES-II LAB

Internal Marks: 20
External Marks: 30

Course Objectives:

1. To test transformer for efficiency calculation
2. To convert 2 phase to 3- phase.
3. To find losses

1. O.C. & S.C. Tests on Single phase Transformer
2. Sumpner's test on a pair of single phase transformers
3. Scott connection of transformers
4. No-load & Blocked rotor tests on three phase Induction motor
5. Regulation of a three –phase alternator by synchronous impedance & m.m.f. methods
6. V and Inverted V curves of a three—phase synchronous motor.
7. Equivalent Circuit of a single phase induction motor
8. Determination of Xd and Xq of a salient pole synchronous machine
9. Parallel operation of Single phase Transformers
10. Separation of core losses of a single phase transformer
11. Brake test on three phase Induction Motor
12. Regulation of three-phase alternator by Z.P.F. method
13. Efficiency of a three-phase alternator
14. Measurement of sequence impedance of a three-phase alternator.

Course Outcomes:

Students will be able to understand

1. Testing a transformer and find losses
2. Converting one phase to another phase.
3. The Concept of Sharing Loads on multiple transformers.
4. Various regulation methods.
5. Measuring sequence impedance.
6. Magnetization of machine.

Note:

Minimum 12 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations. In case if the student fails to get eligibility for semester end exams in the current semester, he/she has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted.

III Year-I Semester **COURSE CODE: UR19PCEEL502** **L T P C**
0 0 3 1.5

ELECTRICAL MEASUREMENTS LAB

Internal Marks: 20
External Marks: 30

Course Objectives:

1. To understand the correct function of electrical parameters and calibration of voltage, current, single phase and three phase power and energy, and measurement of electrical characteristics of resistance, inductance and capacitance of a circuits through appropriate methods.
2. To understand testing of transformer oil.

1. Calibration and Testing of single phase energy Meter
2. Calibration of dynamometer wattmeter using phantom loading
3.Calibration of PMMC ammeter and voltmeter using Crompton D.C. Potentiometer
4.Measurement of resistance and Determination of Tolerance using Kelvin's double Bridge.
5. Capacitance Measurement using Schering bridge.
6. Inductance Measurement using Anderson bridge.
7. Measurement of 3 phase reactive power with single phase wattmeter for balanced loading.
8. Calibration of LPF wattmeter by direct loading.
9. Measurement of 3 phase power with two watt meters
10. Dielectric oil testing using H.T test Kit.
11.Measurement of choke parameters.
12. Measurement of Power by 3 Voltmeter method and by 3 Ammeter method.
13. Testing of C.T. using mutual inductance method.
14. Testing of P.T. using absolute null method.

Course Outcomes:
Students will be able to

1. Measure the electrical parameters voltage, current, power, energy and electrical characteristics of resistance, inductance and capacitance.
2. Test transformer oil for its effectiveness.
3. Measure the parameters of inductive coil.
4. Measures choke parameter.
5. Measure power.
6. Calibrate p.f meter.

Note: Minimum 12 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations. In case if the student fails to get eligibility for semester end exams in the current semester, he/she has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted.

III Year- I Semester **COURSE CODE: UR19PCEEL503** **L T P C**
0 0 3 1.5

CONTROL SYSTEMS LAB

Internal Marks: 20
External Marks: 30

Course Objectives:

1. To impart hands on experience to understand the performance of basic control system components such as magnetic amplifiers, D.C. servo motors, A.C. Servo motors, stepper motor and potentiometer.
2. To understand time and frequency responses of control system with and without controllers and compensators.

1. Time response of Second order system
2. Characteristics of Synchros
3. Programmable logic controller – characteristics of stepper motor
4. Effect of feedback on DC servo motor
5. Effect of P, PD, PI, PID Controller on a second order systems
6. Lag and lead compensation – Magnitude and phase plot
7. DC position control system
8. Transfer function of DC motor
9. Temperature controller using PID
10. Characteristics of magnetic amplifiers
11. Characteristics of AC servo motor
12. Characteristics of DC servo motor
13. Potentiometer as an error detector
14. Matlab programming on root locus, bode plot, nyquist plot.

Course Outcomes

Students will be

1. Able to analyze the performance and working Magnetic amplifier, D.C. servo motors, A.C. Servo motors and synchronous motors.
2. Able to design P,PI,PD and PID controllers
3. Able to design lag, lead and lag–lead compensators
4. Able to control the temperature using PID controller
5. Able to determine the transfer function of D.C.motor
6. Able to control the position of D.C servo motor performance

Note: Minimum 12 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations. In case if the student fails to get eligibility for semester end exams in the current semester, he/she has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted.

III Year- II Semester **COURSE CODE: UR19PCEE601** **L T P C**
3 0 0 3

POWER SYSTEM ANALYSIS

Internal Marks: 30
External Marks: 70

Course Objectives:

1. To development the impedance diagram (p.u) and formation of Y bus
2. To study the different load flow methods.
3. To study the concept of the Z bus building algorithm.
4. To study short circuit calculation for symmetrical faults
5. To study the effect of unsymmetrical faults and their effects.
6. To study the rotor angle stability of power systems.

UNIT –I:
Per Unit Representation & Topology Per Unit Quantities–Single line diagram– Impedance diagram of a power system–Graph theory definition – Formation of element node incidence and bus incidence matrices – Primitive network representation – Formation of Y–bus matrix by singular transformation and direct inspection methods.

UNIT –II:
Power Flow Studies
Necessity of power flow studies – Derivation of static power flow equations – Power flow solution using Gauss-Seidel Method – Newton Raphson Method (Rectangular and polar coordinates form) –Decoupled and Fast Decoupled methods – Algorithmic approach – Problems on 3–bus system only.

UNIT –III:
Z–Bus formulation
Formation of Z–Bus: Partial network– Algorithm for the Modification of Z bus Matrix for addition element for the following cases: Addition of element from a new bus to reference– Addition of element from a new bus to an old bus.(Problems).

UNIT – IV:
Symmetrical Fault Analysis
Transients on a Transmission line-Short circuit of synchronous machine (on no-load) - 3–Phase short circuit currents and reactances of synchronous machine–Short circuit MVA calculations .

Symmetrical Components & Fault analysis
Definition of symmetrical components - symmetrical components of unbalanced three phase systems – Power in symmetrical components – Sequence impedances – Synchronous generator – Transmission line and transformers – Sequence networks –Various types of faults LG– LL– LLG and LLL on unloaded alternator–unsymmetrical faults on power system.

UNIT – V:

Power System Stability Analysis

Elementary concepts of Steady state– Dynamic and Transient Stabilities–Power Angle Curve and Determination of Steady State Stability –Derivation of Swing Equation–Determination of Transient Stability by Equal Area Criterion–Applications of Equal Area Criterion–Methods to improve steady state and transient stability.

TEXT BOOKS:

1. Power System Analysis by Grainger and Stevenson, Tata McGraw Hill.
2. Modern Power system Analysis – by I.J.Nagrath &D.P.Kothari: Tata McGraw–Hill Publishing Company, 2nd edition.

REFERENCE BOOKS:

1. Power System Analysis – by A.R.Bergen, Prentice Hall, Inc.
2. Power System Analysis by HadiSaadat – TMH Edition.
3. Power System Analysis and Design by J.Duncan Glover, M.S.Sarma, T.J.Overbye – CengageLearning publications.

Course Outcomes:

Students will be able to

1. Draw impedance diagram for a power system network and to understand per unit quantities.
2. Form a Y bus and Z bus for a power system networks.
3. Understand the load flow solution of a power system using different methods.
4. Find the fault currents for all types faults to provide data for the design of protective devices.
5. Find the sequence components of currents for unbalanced power system network.
6. Analyze the steady state, transient and dynamic stability concepts of a power system.

III Year- II Semester **COURSE CODE: UR19HM602** **L T P C**
3 0 0 3

MANAGEMENT SCIENCE

Internal Marks: 30
External Marks: 70

Course Objectives:

1. To familiarize with the process of management and to provide basic insight into select contemporary management practices
2. To provide conceptual knowledge on functional management and strategic management.

Unit I

Introduction to Management: Concept –nature and importance of Management –Generic Functions of Management – Evaluation of Management thought- Theories of Motivation – Decision making process-Designing organization structure- Principles of organization – Organizational typology- International Management: Global Leadership and Organizational behavior Effectiveness(GLOBE).

Unit II

Operations Management: Principles and Types of Management – Work study- Statistical Quality Control- Control charts (P-chart, R-chart, and C-chart) Simple problems- Material Management: Need for Inventory control- EOQ, ABC analysis (simple problems) and Types of ABC analysis (HML, SDE, VED, and FSN analysis).

Unit III

Functional Management: Concept of HRM, HRD and PMIR- Functions of HR Manager- Wage payment plans(Simple Problems) – Job Evaluation and Merit Rating - Marketing Management- Functions of Marketing – Marketing strategies based on product Life Cycle.

Unit IV

Project Management: (PERT/CPM): Development of Network – Difference between PERT and CPM Identifying Critical Path- Probability- Project Crashing (Simple Problems)

Strategic Management: Vision, Mission, Goals, Strategy – Elements of Corporate Planning Process – Environmental Scanning – SWOT analysis- Steps in Strategy Formulation and Implementation. Global strategies, theories of Multinational Companies.

Unit V

Contemporary Management Practice: Basic concepts of MIS, MRP, Justin- Time(JIT) system, Total Quality Management(TQM), Six sigma and Capability Maturity Model(CMM) Levies, Supply Chain Management , Enterprise Resource Planning (ERP), Business Process outsourcing (BPO).

TEXT BOOKS:

1. Dr. P. Vijaya Kumar & Dr. N. Appa Rao, 'Management Science' Cengage, Delhi, 2012.
2. Dr. A. R. Aryasri, Management Science' TMH 2011.

REFERENCE BOOKS:

1. Koontz & Weihrich: 'Essentials *of management'* TMH 2011
2. Seth & Rastogi: Global Management Systems, Cengage learning , Delhi, 2011
3. Robbins: Organizational Behaviour, Pearson publications, 2011
4. Kanishka Bedi: Production & Operations Management, Oxford Publications, 2011
5. Philip Kotler & Armstrong: Principles of Marketing, Pearson publications
6. Biswajit Patnaik: Human Resource Management, PHI, 2011
7. Hitt and Vijaya Kumar: Starategic Management, Cengage learning
8. Prem Chadha: Performance Management, Trinity Press(An imprint of Laxmi Publications
9. Anil Bhat& Arya Kumar : Principles of Management, Oxford University Press, New Delhi, 2015.

Course Outcomes:

By the end of the course, the student will be able to

1. Plan organizational structure for a given context in the organisation carry out production operations through Work study.
2. Carry out production operations through Work study.
3. Understand the markets, customers and competetion better and price the given products appropriately.
4. Ensure quality for a given product or service.
5. Plan and control the HR function better.
6. Plan, schedule and control projects through PERT and CPM and Evolve a strategy for a business or service organisation.

III Year- II Semester **COURSE CODE: UR19PCEE603** **L T P C**
3 0 0 3

ELECTRICAL DRIVES

Internal Marks: 30
External Marks: 70

Learning Objectives:

1. To learn the fundamentals of electric drive and different electric braking methods.
2. To analyze the operation of three phase converter controlled dc motors and four quadrant operation of dc motors using dual converters.
3. To discuss the converter control of dc motors in various quadrants.
4. To understand the concept of speed control of induction motor by using AC voltage controllers and voltage source inverters.
5. To learn the principles of static rotor resistance control and various slip power recovery schemes.
6. To understand the speed control mechanism of synchronous motors

UNIT–I

Fundamentals of Electric Drives

Electric drive – Fundamental torque equation – Load torque components – Nature and classification of load torques– Four quadrant operation of drive (hoist control) – Braking methods: Dynamic – Plugging – Regenerative methods.- selection of motor ratings-closed loop operation of drive-AC drives and DC drives

UNIT–II

Controlled Converter Fed DC Motor Drives

1-phase half and fully controlled converter fed separately and self-excited DC motor drive – Output voltage and current waveforms – Speed-torque expressions – Speed-torque characteristics.- closed loop operation of DC motor

UNIT–III

DC–DC Converters Fed DC Motor Drives

Single quadrant – Two quadrant and four quadrant DC-DC converter fed separately excited and self-excited DC motors – Continuous current operation– Output voltage and current waveforms – Speed–torque expressions – Speed–torque characteristics –Four quadrant operation –closed loop operation chopper controlled DC excited drives below and above rated speeds

UNIT–IV

Stator side control of 3-phase Induction motor Drive

Stator voltage control using 3-phase AC voltage regulators – Waveforms –Speed torque characteristics– Variable Voltage Variable Frequency control of induction motor by PWM voltage source inverter – closed loop operation of induction motor drive.

UNIT–V

Rotor side control of 3-phase Induction motor Drive

Static rotor resistance control – Slip power recovery schemes – Static Scherbius drive – Static Kramer drive – Speed torque characteristics.

Control of Synchronous Motor Drives

Separate control & self-control of synchronous motors – Operation of self-controlled synchronous motors by VSI– Closed Loop control operation of synchronous motor drives.

TEXT BOOKS:

1. Fundamentals of Electric Drives – by G K Dubey Narosa Publications

2. Power Semiconductor Drives, by S.B.Dewan, G.R.Slemon, A.Straughen, Wiley- India Edition.

REFERENCE BOOKS:

1.Electric Motors and Drives Fundamentals, Types and Apllications, by Austin Hughes and Bill Drury, Newnes.

2.Thyristor Control of Electric drives – Vedam Subramanyam Tata McGraw Hill Publications.

3. Power Electronic Circuits, Devices and applications by M.H.Rashid, PHI

Course Outcomes:

After completion of the course, students will be able to:

1. Explain the fundamentals of electric drive and different electric braking methods.
2. Analyze the operation of three phase converter fed dc motors and four quadrant operations of dc motors using dual converters.
3. Describe the converter control of dc motors in various quadrants of operation
4. Know the concept of speed control of induction motor by using AC voltage controllers and voltage source inverters.
5. Differentiate the stator side control and rotor side control of three phase induction motor.
6. Explain the speed control mechanism of synchronous motors

III Year- II Semester **COURSE CODE: UR19PCEE604** **L T P C**
3 0 0 3

MICROPROCESSORS AND MICROCONTROLLERS

Internal Marks: 30
External Marks: 70

Course Objectives:

1. To understand the organization and architecture of Micro Processor
2. To understand addressing modes to access memory
3. To understand 8051 micro controller architecture
4. To understand the programming principles for 8086 and 8051
5. To understand the interfacing of MP with IO as well as other devices.
6. To understand how to develop cyber physical systems

UNIT–I:
Introduction to Microprocessor Architecture
Introduction and evolution of Microprocessors– Architecture of 8086– Register Organization of 8086–Memory organization of 8086– General bus operation of 8086–Introduction to 80286– 80386 and 80486 and Pentium.

UNIT–II:
Minimum and Maximum Mode Operations
Instruction set, Addressing modes– Minimum and Maximum mode operations of 8086–8086 Control signal interfacing–Read and write cycle timing diagrams.

UNIT–III:
Assembly Language Programming
Assembly Directives–Macro's– Algorithms for Implementation of FOR Loop–WHILE– REPEAT and IF-THEN-ELSE Features–Addressing modes and Instruction set of 8051– Assembly language programming of 8051– Development systems and tools.

UNIT–IV:
I/O Interface
8255 PPI– Architecture of 8255–Modes of operation– Interfacing I/O devices to 8086 using 8255–Interfacing A to D converters– Interfacing D to A converters– Stepper motor interfacing– Static memory interfacing with 8086– DMA controller (8257)–Architecture–Interfacing 8257 DMA controller– Programmable Interrupt Controller (8259).

UNIT–V:
Introduction to 8051 Micro Controller
Overview of 8051 Micro Controller– Architecture– Register set–I/O ports and Memory Organization– Interrupts–Timers and Counters–Serial Communication.

Cyber physical systems and industrial applications of 8051
Applications of Micro Controllers– Interfacing 8051 to LED's–Push button– Relay's and Latch Connections– Interfacing Seven Segment Display–ADC and DAC Interfacing.

TEXT BOOKS:
1. Microprocessors and Interfacing, Douglas V Hall, Mc–Graw Hill, 2nd Edition.
2. Kenneth J Ayala, "The 8051 Micro Controller Architecture, Programming and Applications", Thomson Publishers, 2nd Edition.
3. Ray and Burchandi, "Advanced Micro Processors and Interfacing", Tata McGraw–Hill.

REFERENCE BOOKS:
1. R.S. Kaler, " A Text book of Microprocessors and Micro Controllers", I.K. International Publishing House Pvt. Ltd.
2. Ajay V. Deshmukh, "Microcontrollers – Theory and Applications", Tata McGraw–Hill Companies –2005.
3. Ajit Pal, "Microcontrollers – Principles and Applications", PHI Learning Pvt Ltd, 2011.

Course Outcomes:
Students will be able to

1. Understand the microprocessor capability in general and explore the evolution of microprocessors.
2. Understand the addressing modes of microprocessors
3. Understand the micro controller capability
4. Program mp and mc
5. Interface mp and mc with other electronic devices
6. Develop cyber physical systems

III Year- II Semester **COURSE CODE: UR19PEEE601** **L T P C**
3 0 0 3

DESIGN OF ELECTRICAL APPARATUS
(Professional Elective-II)

Internal Marks: 30
External Marks: 70

Course Objectives:

1. To study mmf calculation and thermal rating of various types of electrical machines.
2. To design MMF on various machines
3. Optimization techniques applied in design of machines.
4. To design armature and field systems for D.C. machines.
5. To design core, yoke, windings and cooling systems of transformers.

UNIT I

Introduction: Design factors, Limitations in design, Thermal design aspects, standard specification. Electrical Engineering Materials – Space factor – Choice of Specific Electrical and Magnetic loadings - - Heat flow – Temperature rise - Rating of machines.

UNIT II

Concept of magnetic circuit – MMF calculation for various types of electrical machines – real and apparent flux density of rotating machines – leakage reactance calculation for transformers, induction and synchronous machine - thermal rating: continuous, short time and intermittent short time rating of electrical machines-direct and indirect cooling methods – cooling of turbo alternators

UNIT III

Optimization techniques as applied to design of electrical machines: Study of cooling systems. Computer aided design: Advantage of computer aided design, Flow chart for computer aided design.

UNIT IV

DC machines: Specific loadings, output equation, Design of main dimensions. Design of Armature windings, Design of field system, Design of interpole and commutator.

UNIT V

Transformers: Output equation-volt per turn, main dimensions for three phase and single phase transformers, window dimensions & Yoke design and coil design. Design of tank with tubes.

TEXT BOOK:

1.K. Sawhney and A. Chakarabarti 'A course in Electrical machine Design' Dhanpat Rai A. & Co., New Delhi, Sixth edition 2006.

REFERENCE BOOKS:

1. Alexander Gray "Electrical Machine Design - The Design and Specification of Direct and Alternating Current", Gray Press, 2007.
2. Juha Pyrhonen, Tapani Jokinen, Valeria Hrabovcova "Design of Rotating Electrical machines" John Wiley & Son, 2009.
3. S. K. Sen, 'Principles of Electrical Machine Design with Computer Programmes', Oxford and IBH Publishing Co. Pvt Ltd., New Delhi, 1987

Course Outcomes:

Students will able to understand

1. Basic design requirements of electrical machines.
2. Design of MMF calculations.
3. Rating of machine.
4. Various optimization techniques while designing.
5. Design armature and field systems for D.C. machines.
6. Concept core, yoke, windings and cooling systems of transformers.

III Year- II Semester **COURSE CODE: UR19PEEE602** **L T P C**
3 0 0 3

ELECTRIC MACHINE DESIGN
(Professional Elective-II)

Internal Marks: 30
External Marks: 70

Course Objectives:

1. To study mmf calculation and thermal rating of various types of electrical machines.
2. To design armature and field systems for D.C. machines.
3. To design core, yoke, windings and cooling systems of transformers.
4. To design stator and rotor of induction machines.
5. To design stator and rotor of synchronous machines and study their thermal behaviour.

UNIT-I

Principles of Electrical machines design, Design concept of parts and special features, rating, Specifications, Standards, Performance and other criteria to be considered for designing. Brief study of magnetic, electric, dielectric and other materials. Design of heating coils, starters and regulators.

General awareness of IS Codes, Electricity Acts & Rules, NEC. Domestic Installations, Motor Installations, 11 kV substation installations.

UNIT-II

D C Machines: Output equation – main dimensions choice of specific electromagnetic loadings – choice of speed and number of poles. Design of armature conductors, slots and windings – design of airgap, field system, commutator, interpoles, compensating winding and brushes – Carter's co-efficient – real and apparent flux density. Design examples.

UNIT- III

Transformers: Single phase and Three phase transformers – output equation - main dimensions – specific electric and magnetic loadings – design of core, LV winding, HV winding – cooling of transformers – design of cooling tank and tubes. Temperature rise time curve – short time and continuous rating.

UNIT- IV

Alternators: Salient pole and turbo alternators – output equation – main dimensions – choice of specific electric and magnetic loadings – choice of speed and number of poles – design of armature conductors, slots and winding – design of air-gap, field system and damper winding ..

UNIT- V

Induction machines:- Output equation – main dimensions – choice of specific electric and magnetic loadings – design of stator and rotor windings, stator and rotor slots and airgap of slip ring and squirrel cage motors – calculation of rotor bar and end ring currents in cage rotor .

TEXT BOOKS:

1. AK.Sawhney - Electrical Machine Design,
2. Clayton & Hancock - Performance and Design of DC Machines,

REFERENCE BOOK:

1. Performance and Design of AC Machines, Pitman,

Course Outcomes:

Student will able to

1. Explore the limitations of the computational methods on digital images.
2. Implement the spatial and frequency domain image transforms on enhancement and restoration of images.
3. Elaborate understanding on image enhancement techniques.
4. Define the need for compression and evaluate the basic compression algorithms.
5. Understand concept of armature reaction.
6. Design the stator and rotor of a synchronous machine.

III Year- II Semester **COURSE CODE: UR19PEEE603** **L T P C**
3 0 0 3

ELECTRICAL MATERIALS
(Professional Elective-II)

Internal Marks: 30
External Marks: 70

Course Objectives:

After completion of this course, the student will be able to

1. Understand various types of dielectric materials, their properties in various conditions.
2. Evaluate magnetic materials and their behavior.
3. Evaluate semiconductor materials and technologies.
4. Acquire Knowledge on Materials used in electrical engineering and applications.

UNIT- I: Dielectric Materials: Dielectric as Electric Field Medium, leakage currents, dielectric loss, dielectric strength, breakdown voltage, breakdown in solid dielectrics, flashover, liquid dielectrics, electric conductivity in solid, liquid and gaseous dielectrics, Ferromagnetic materials, properties of ferromagnetic materials in static fields, spontaneous, polarization, curie point, anti-ferromagnetic materials

UNIT – II: Magnetic Materials: Classification of magnetic materials, spontaneous magnetization in ferromagnetic materials, magnetic Anisotropy, Magnetostriction, diamagnetism, magnetically soft and hard materials, special purpose materials, feebly magnetic materials, Ferrites, cast and cermet permanent magnets, ageing of magnets.

UNIT – III: Semiconductor Materials: Properties of semiconductors, Silicon wafers, integration techniques, Large and very large scale integration techniques (VLSI)

UNIT – IV: Materials for Electrical Applications: Materials used for Resistors, rheostats, heaters, transmission line structures, stranded conductors, bimetals fuses, soft and hard solders, electric contact materials, electric carbon materials,.

UNIT – V: Special Purpose Materials: Refractory Materials, Structural Materials, Radioactive Materials, Galvanization and Impregnation of materials, Processing of electronic materials, Insulating varnishes and coolants, Properties and applications of mineral oils, Testing of Transformer oil as per ISI

TEXT BOOKS:

1.“R K Rajput”, “ A course in Electrical Engineering Materials”, Laxmi Publications, 2009

2.“T K Basak”, “ A course in Electrical Engineering Materials”, New Age Science Publications 2009

REFERENCE BOOKS:

1.TTTI Madras, “Electrical Engineering Materials”, McGraw Hill Education, 2004.

2.“AdrianusJ.Dekker”, Electrical Engineering Materials, PHI Publication, 2006.

3.S. P. Seth, P. V. Gupta “A course in Electrical Engineering Materials”, Dhanpat Rai & Sons, 2011.

Course Outcomes:

After completion of this course, the student will be able to

1. Understand various types of dielectric materials, their properties in various conditions.
2. Calculate magnetic materials and their behavior.
3. Evaluate semiconductor materials and technologies.
4. Acquire Knowledge on Materials used in electrical engineering and applications.
5. Understand Materials for Electrical Applications.
6. Understand special purpose materials.

III Year- II Semester **COURSE CODE: UR19PEEE604** **L T P C**
3 0 0 3

IOT APPLICATION TO ELECTRICAL ENGINEERING
(Professional Elective-II)

Internal Marks: 30
External Marks: 70

Course Objectives:

The objectives of this course is to acquire knowledge on

1. Architecture and various technologies of Internet of Things.
2. Communication technologies used in the Internet of Things.
3. Connectivity of devices using web and internet in the IoT environment.
4. Various data acquisition methods and data handling using cloud for IoT applications.
5. IoT implementation for Smart Home, Smart city, etc.

UNIT - I:

The Internet of Things: An Overview of Internet of Things (IoT) – IoT framework –Architecture – Technology behind IoT – Sources of the IoT – M2M Communication – Examples of IoT.

UNIT – II:

Design Principles for Connected Devices: Introduction –IoT/M2M systems, Layers and Designs Standardization – Communication Technologies – Data Enrichment, Consolidation and Device Management at Gateway – Ease of designing and affordability.

UNIT – III:

Design Principles for the Web Connectivity: Introduction – Web Communication protocols for Connected Devices - Message Communication protocols for Connected Devices – Web Connectivity for connected devices network. Introduction to Internet Connectivity Principles, Internet connectivity, Internet based communication – IP addressing in the IoT – Application Layer Protocols: HTTP, HTTPS, FTP, Telnet, WAP (Wireless Application Protocol).

UNIT–IV:

Data Acquiring, Organizing, Processing and Analytics: Introduction – Data Acquiring and Storage – Organizing the Data – Analytics. Data Collection, Storage and Computing Using a Cloud Platform: Introduction – Cloud computing paradigm for data collection, storage and computing – IoT as a service and Cloud Service Models - IoT cloud based services using the Xively (Pachube/COSM), Nimbits and other platforms.

UNIT– V:

Sensor technology: Actuator, Sensor data communication protocols, Radio Frequency Identification technology, Wireless Sensor Network Technology. IoT application case studies: Smart Home, Smart Cities, Environment monitoring and Agriculture practices

TEXT BOOK:

1. Internet of Things: Architecture, Design Principles, Raj Kamal, McGraw Hill Education (India) Pvt. Limited, 2017.

REFERENCE BOOKS:

1. Designing the Internet of Things, Adrian McEwen and Hakim Cassimally, Wiley, First edition, 2013.

2. Getting Started with the Internet of Things, CunoPfister, O'reilly, 2011.

3. Internet of Things: A Hands-on Approach, Arshdeep Bahga, and Vijay Madisetti, 2014

Course Outcomes:

The students should be able to

1. Know the various fundamentals, architectures and technologies of Internet of Things.
2. Discuss about various communication technologies used in the Internet of Things.
3. Acquire knowledge on the various device connectivity methods using web and internet in the IoT environment.
4. Explore various data acquisition methods, data handling using cloud for IoT applications.
5. Apply IoT to design Smart Home, Smart city, agriculture practices etc.
6.Implement Data collection methods.

III Year- II Semester **COURSE CODE: UR19PEEE605** **L T P C**
3 0 0 3

DIGITAL SIGNAL PROCESSING
(Professional Elective-II)

Internal Marks: 30
External Marks: 70

Course Objectives:
The course objectives are:
1. To provide background and fundamental concepts for the analysis and processing of digital signals.
2. To understand the fast computation of DFS and DFT.
3. To design digital filters and their realization structures.
4. To acquaint in Multi-rate signal processing techniques and finite word length effects.

UNIT I
Introduction: Introduction to Digital Signal Processing: Discrete Time Signals & Sequences, conversion of continuous to discrete signal, Normalized Frequency, Linear Shift Invariant Systems, Stability, and Causality, linear differential equation to difference equation, Linear Constant Coefficient Difference Equations, Frequency Domain Representation of Discrete Time Signals and Systems.
Realization of Digital Filters: Applications of Z – Transforms, Solution of Difference Equations of Digital Filters, System Function, Stability Criterion, Frequency Response of Stable Systems, Realization of Digital Filters – Direct, Canonic, Cascade and Parallel Forms.

UNIT II
Discrete Fourier series: Fourier Series, Fourier Transform, Laplace Transform and Z-Transform relation, DFS Representation of Periodic Sequences, Properties of Discrete Fourier Series, Discrete Fourier Transforms: Properties of DFT, Linear Convolution of Sequences using DFT, Computation of FT: Over-Lap Add Method, Over-Lap Save Method, Relation between DTFT, DFS, DFT and Z-Transform.
Fast Fourier Transforms: Fast Fourier Transforms (FFT) - Radix-2 Decimation-in-Time and Decimation-in-Frequency FFT Algorithms, Inverse FFT.

UNIT III
IIR Digital Filters: Analog filter approximations – Butterworth and Chebyshev, Design of IIR Digital Filters from Analog Filters, Step and Impulse Invariant Techniques, Bilinear Transformation Method, Spectral Transformations.

UNIT IV

FIR Digital Filters: Characteristics of FIR Digital Filters, Frequency Response. Design of FIR Filters: Fourier Method, Digital Filters using Window Techniques, Frequency Sampling Technique, Comparison of IIR & FIR filters.

UNIT V

Multirate Digital Signal Processing: Introduction, Down Sampling, Decimation, Up sampling, Interpolation, Sampling Rate Conversion.

Finite Word Length Effects: Limit cycles, Overflow Oscillations, Round-off Noise in IIR Digital Filters, Computational Output Round Off Noise, Methods to Prevent Overflow, Trade Off Between Round Off and Overflow Noise, Measurement of Coefficient Quantization Effects through Pole-Zero Movement, Dead Band Effects.

TEXT BOOKS

1. Discrete Time Signal Processing – A. V. Oppenheim and R.W. Schaffer, PHI, 2009
2. Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis, Dimitris G. Manolakis, Pearson Education / PHI, 2007.

REFERENCE BOOKS

1. Digital Signal Processing – Fundamentals and Applications – Li Tan, Elsevier, 2008
2. Fundamentals of Digital Signal Processing using MATLAB – Robert J. Schilling, Sandra L. Harris, Thomson, 2007
3. Digital Signal Processing – K. Deergha Rao and M. N. S. Swamy, Springer, 2018.
4. Digital Signal Processing - A Practical approach, Emmanuel C. Ifeachor and Barrie W. Jervis, 2nd Edition, Pearson Education, 2009

Course Outcomes:

Upon completing this course, the student will be able to:

1. Understand the LTI-DT systems, their frequency domain representation and realization.
2. Distinguish DFTS, DFS, DFT and FFT.
3. Explain the concept of IIR Digital Filters.
4. Design IIR digital filters from prototype approximations.
5. Identify FIR digital filters from prototype approximations.
6. Demonstrate the importance of Multirate signal processing and finite word length effects in DSP applications.

III Year- II Semester **COURSE CODE:**

L	T	P	C
3	0	0	3

OPEN ELECTIVE-I

Internal Marks: 30
External Marks: 70

The student can choose any one Open Elective-I (OE-I) subject offered by other branches. The list of OEs are available in Course Structure.

III Year- II Semester **COURSE CODE: UR19PCEEL601** **L T P C**
0 0 3 1.5

POWER ELECTRONICS LAB

Internal Marks: 20
External Marks: 30

Learning objectives:

1. To study the characteristics of various power electronic devices and analyze firing circuits and commutation circuits of SCR.
2. To analyze the performance of single–phase and three–phase full–wave bridge converters with both resistive and inductive loads.

1. Study of Characteristics of Thyristor, MOSFET & IGBT.
2. Design and development of a firing circuit for Thyristor.
3. Design and development of gate drive circuits for IGBT.
4. Single -Phase Half controlled converter with R and RL load
5. Single -Phase fully controlled bridge converter with R and RL loads
6. Single -Phase AC Voltage Regulator with R and RL Loads
7. Single -Phase square wave bridge inverter with R and RL Loads
8. Three- Phase fully controlled converter with RL–load.
9. Design and verification of voltages gain of Boost converter in Continuous Conduction Mode(CCM) and Discontinuous Conduction Mode(DCM).
10. Design and verification of voltages ripple in buck converter in CCM operation.
11. Single -phase PWM inverter with sine triangle PWM technique.
12. 3-phase AC-AC voltage regulator with R-load.
13.1-Ph Parallel Inverter With R and RL Load
14. 1-Ph Series Inverter With R and RL Load.

Course Outcomes:

Students able to

1. Study the characteristics of various power electronic devices and analyze gate drive circuits of IGBT.
2. Analyze the performance of single–phase and three–phase full–wave bridge converters with both resistive and inductive loads.
3. Understand the operation of single phase AC voltage regulator with resistive and inductive loads.
4. Understand the working of Buck converter, Boost converter, single–phase square wave inverter and PWM inverter.
5. Understand the operation of AC voltage regulator with resistive and inductive loads.
6. Understand the working of Buck converter, Boost converter and inverters.

Note:

Minimum 12 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations. In case if the student fails to get eligibility for semester end exams in the current semester, he/she has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted.

III Year- II Semester **COURSE CODE: UR19PCEEL602** **L T P C**
0 0 3 1.5

MICROPROCESSORS AND MICROCONTROLLERS LAB

Internal Marks: 20
External Marks: 30

Learning Objectives:

1. To study programming based on 8086 microprocessor and 8051microcontroller.
2. To study 8056 microprocessor based ALP using arithmetic, logical and shift operations.
3. To study modular and Dos/Bios programming using 8086 micro processor.
4. To study to interface 8086 with I/O and other devices.
5. To study parallel and serial communication using 8051 micro controller.

I. Microprocessor 8086 :

Introduction to MASM/TASM.

1. Arithmetic operation – Multi byte addition and subtraction, multiplication and division – Signed and unsigned arithmetic operation, ASCII – Arithmetic operation.
2. Logic operations – Shift and rotate – Converting packed BCD to unpacked BCD, BCD to ASCII conversion.
3. By using string operation and Instruction prefix**:** Move block, Reverse string Sorting, Inserting, Deleting, Length of the string, String comparison.
4. Modular Program: Procedure, Near and Far implementation, Recursion.
5. Dos/BIOS programming: Reading keyboard (Buffered with and without echo) – Display characters, Strings.
6. Interfacing 8255–PPI
7. Programs using special instructions like swap, bit/byte, set/reset etc.
8. Programs based on short, page, absolute addressing.
9. Interfacing 8259 – Interrupt Controller.
10. Interfacing 8279 – Keyboard Display.
11. Stepper motor control using 8253/8255.

Microcontroller 8051

12. Reading and Writing on a parallel port.
13. Timer in different modes.
14. Serial communication implementation.
15. Understanding three memory areas of 00 – FF (Programs using above areas).

Using external interrupts.

Course Outcomes:

1 Will be able to write assembly language program using 8086 micro based on arithmetic, logical, and shift operations.

2 Will be able to do modular and Dos/Bios programming using 8086 micro processor.

3 Will be able to interface 8086 with I/O and other devices.
4 Will be able to do parallel and serial communication using 8051 micro controllers.

Note:

Minimum 12 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations. In case if the student fails to get eligibility for semester end exams in the current semester, he/she has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted.

III Year- II Semester **COURSE CODE: UR19MC601** **L T P C**
0 0 0 0

ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE

Internal Marks: 50

Course Objectives:

1. The course aims at imparting basic principles of thought process, reasoning and inferencing. Sustainability is at the core of Indian Traditional Knowledge Systems connecting society and nature.
2. Holistic life style of Yogic-science and wisdom capsules in Sanskrit literature are also important in modern society with rapid technological advancements and societal disruptions.
3.The course focuses on introduction to Indian Knowledge System, Indian perspective of modern scientific world-view and basic principles of Yoga and holistic health care system.

COURSE CONTENT:

Basic structure of Indian Knowledge System: अ ा दशिव4ा -४वेद,४उपवेद (आयुव ेद, धनुव ेद,

गNव ेद, 3थ पÆ शआद) ६वेद ांग (शाि¶ा , क¾, शान7ª, ा करण, ¾ा शातष, छां द) ४ उप

इग (धम ि ™, मीम ांस , पुर ण, तक ि ™)

- Modern Science and Indian Knowledge System
- Yoga and Holistic Health care
- Case studies

Philosophical Tradition (सव दि न)-¾ा य, वैि ेशापक, स ां%, य ग, मीम ांस , वेद ांत, च व, जाै न, बा \

- Indian Linguistic Tradition (Phonology, morphology, syntax and semantics)
- Indian Artistic Tradition - शाच7कल , मूशात कल , व ™ाु कल , 3थ पÆ, सांगीत, नृÆएवांस
- शाहत्य
- Case studies

Suggested Text/Reference Books

1. V. Sivaramakrishna (Ed.), Cultural Heritage of India-Course Material, Bharatiya Vidya Bhavan, Mumbai, 5th Edition, 2014
2. Swami Jitatmanand, Modern Physics and Vedant, Bharatiya Vidya Bhavan
3. Fritzof Capra, Tao of Physics
4. Fritzof Capra, The wave of Life
5. V N Jha (Eng. Trans,), Tarkasangraha of Annam Bhatta, Inernational Chinmay Foundation, Velliarnad, Amaku,am
6. Yoga Sutra of Patanjali, Ramakrishna Mission, Kolkatta
7. GN Jha (Eng. Trans.) Ed. R N Jha, Yoga-darshanam with Vyasa Bhashya, Vidyanidhi Prakasham, Delhi, 2016
8. RN Jha, Science of Consciousness Psychotherapy and Yoga Practices, Vidyanidhi Prakasham, Delhi, 2016
9. P R Sharma (English translation), Shodashang Hridayam

Course Outcomes:

Students able to

1. Ability to understand , connect up and explain basics of Indian Traditional knowledge modern scientific perspective.
2. Understand darma shastra, mimasha.
3. Understand chitra kala, mantra kala.
4. Understand phonology, morphology.
5. Understand yoga holistic health care.
6. Understand veda .

III Year - II Semester	COURSE CODE: UR19MPROJEE611	L	T	P	C
		0	0	0	0

SOCIALLY RELEVANT MINI PROJECT

Internal Marks: 20
Semester-end Marks: 30
External Marks: 0

Guidelines:

1. Students should select a problem which addresses some basic home, office or other real life Applications and submit abstract.
2. The electrical and electronic circuit for the selected problem should have at least 15 to 20 components.
3. Students should understand testing of various components.
4. Soldering of components should be carried out by students.
5. Students should develop a necessary circuit connection.
6. Students should see that final circuit submitted by them is in working condition.
7. Report contains 5-10 pages to be submitted by students.
8. Group of maximum three students can be permitted to work on a single mini project.
9. The mini project must have hardware part. The software part is optional.
10. Department may arrange demonstration with poster presentation of all mini projects developed by the students at the end of semester.
11. It is desirable that the electrical and electronic circuit/systems developed by the students have some novel features.

III Year- II Semester **COURSE CODE: UR19OEEE601** **L T P C**
3 0 0 3

NEURAL NETWORKS AND FUZZY LOGIC
(Open Elective-I)

Internal Marks: 30
External Marks: 70

Course Objectives:

1.To give basics of NN
2. To introduce delta rule and ADALINE.
3. To give basics of fuzzy logic

Unit – I: Introduction to Neural Networks
Artificial neural networks- biological neural networks- typical architectures -common activation functions-Types of learning. Supervised, Unsupervised learning- Linear separability- Hebb rule-Perceptron learning rule for pattern classification.

Unit- II: Artificial Neural Networks-I
Delta rule for single output units and Delta rule for several output units- ADALINE architecture, training algorithm and applications, -MADALINE architecture, training algorithm and applications- Back Propagation neural net architecture, training algorithm and applications.

Unit–III: Artificial Neural Networks-II

Delta learning rule for pattern association, Bidirectional Associate Memory(BAM) architecture, training algorithm and applications-Kohonen self organizing maps architecture, training algorithm and applications- Learning Vector Quantitization architecture, training algorithm and applications. Neural network applications: Process identification, control, fault diagnosis and load forecasting.

Unit – IV: Classical & Fuzzy Sets
Introduction to classical sets – properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, membership functions.

.
UNIT V: Fuzzy Logic System Components
Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods.

Fuzzy logic applications: Fuzzy logic control and Fuzzy classification.

TEXT BOOKS:

1. Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications by Rajasekharan and Rai – PHI Publication.
2. Introduction to Neural Networks using MATLAB 6.0 – S.N.Sivanandam, S.Sumathi, S.N.Deepa, TMH, 2006

REFERENCE BOOKS:

1. Neural Networks – James A Freeman and Davis Skapura, Pearson Education, 2002.
2. Neural Networks – Simon Hakins , Pearson Education
3. Neural Engineering by C.Eliasmith and CH.Anderson, PHI
4. Neural Networks and Fuzzy Logic System by Bart Kosko, PHI Publications

Course Outcomes:

Students will be able to understand

1. Basic concepts of NN.
2. Framing various rules using different methods.
3. Architecture of various algorithms.
4. Basic concepts of fuzzy logic
5. Fuzzy sets and fuzzification
6. Defuzzification.

III Year- II Semester **COURSE CODE: UR19OEEE602** **L T P C**
3 0 0 3

LINEAR CONTROL SYSTEMS
(Open Elective-I)
(Except EEE)

Internal Marks: 30
External Marks: 70

Course Objective:

1. To learn the mathematical modeling of physical systems and to use block diagram algebra and signal flow graph to determine overall transfer function.
2. To analyze the time response of first and second order systems and improvement of performance by proportional plus derivative and proportional plus integral controllers.
3. To investigate the stability of closed loop systems using Routh's stability criterion and the analysis by root locus method.
4. To present the Frequency Response approaches for the analysis of linear time invariant (LTI) systems using Bode plots, polar plots and Nyquist stability criterion.
5. To discuss basic aspects of design and compensation of linear control systems using Bode plots.
6. Ability to formulate state models and analyze the systems. To present the concepts of Controllability and Observability.

UNIT – I:
MATHEMATICAL MODELING OF CONTROL SYSTEMS
Open Loop and closed loop control systems and their differences, Classification of control systems, Feed-Back Characteristics, transfer function of linear system, Differential equations of electrical networks, Translational and Rotational mechanical systems, Block diagram algebra – Representation by Signal flow graph - Reduction using Mason's gain formula.

UNIT-II:
TIME RESPONSE ANALYSIS
Standard test signals - Time response of first order systems –Time response of second order systems - Time domain specifications - Steady state errors and error constants – Effects of proportional derivative, proportional integral systems
.

UNIT – III:
STABILITY AND ROOTLOCUS TECHNIQUE
The concept of stability – Routh's stability criterion –limitations of Routh's stability – The root locus concept - construction of root loci (Simple problems).

UNIT–IV:
FREQUENCY RESPONSE ANALYSIS
Introduction, Frequency domain specifications-Bode diagrams- transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots, Polar Plots, Nyquist Stability criterion.

UNIT–V:

CLASSICAL CONTROL TECHNIQUES

Lag, Lead, Lag-Lead compensators.

STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS

Concepts of state, state variables and state model, state space representation of transfer function, Solving the Time invariant state Equations- State Transition Matrix and it's Properties – Concepts of Controllability and Observability.

TEXT BOOKS:

1. Modern Control Engineering, Kotsuhiko Ogata, Prentice Hall of India.
2. Automatic control systems, Benjamin C.Kuo, Prentice Hall of India, 2nd Edition

REFERENCE BOOKS:

1. Control Systems, Manik Dhanesh N, Cengage publications .
2. Control Systems principles and design, M.Gopal, Tata Mc Graw Hill education Pvt Ltd., 4th Edition.
3. Control Systems Engineering, S.Palani, Tata Mc Graw Hill Publications.

Course Outcomes:

1. Ability to represent physical systems as state models and determine the response. Understanding the concepts of controllability and observability.
2. Ability to derive the transfer function of physical systems and determination of overall transfer function using block diagram algebra and signal flow graphs.
3. Capability to determine time response specifications of second order systems and to determine error constants.
4. Acquires the skill to analyze absolute and relative stability of LTI systems using Routh's stability criterion and the root locus method.
5. Capable to analyze the stability of LTI systems using frequency response methods.
6. Able to design Lag, Lead, Lag-Lead compensators to improve system performance from Bode diagrams.

III Year- II Semester **COURSE CODE: UR19OEEE603** **L T P C**
3 0 0 3

ELECTRICAL SAFETY MANAGEMENT
(Open Elective-I)

Internal Marks: 30
External Marks: 70

Course Objectives:

1. To understand various electrical rules and acts.
2. To understand safety precautions in electrical systems

UNIT-I

INTRODUCTION TO ELECTRICAL SAFETY : Terms and definitions, objectives of safety and security measures, Hazards associated with electric current, and voltage, who is exposed, principles of electrical safety, Approaches to prevent Accidents, scope of subject electrical safety, Fire prevention and Fire Fighting.

UNIT-II

ELECTRICAL SHOCKS THEIR PREVENTION AND FIRSTAID:

Primary and secondary electrical shocks, possibilities of getting electrical shock and its severity, medical analysis of electric shocks and its effects, shocks due to flash/ Spark overs, prevention of shocks, safety precautions against contact shocks, flash shocks, burns, residential buildings and shops. First Aid: first principles of actions after electric shocks, External Cardiac massage, Control of bleeding, burns and scalds and Heat exhaustion

UNIT-III

ELECTRICAL SAFETY IN RESIDENTIAL, COMMERCIAL AND AGRICULTURAL INSTALLATIONS :

Wiring and fitting –Domestic appliances – water tap giving shock – shock from wet wall– fan firing shock – multi-storied building – Temporary installations –Agricultural pump installation – Do's and Don'ts for safety in the use of domestic electrical appliances.

UNIT-IV

SAFETY DURING INSTALLATION, TESTING AND COMMISSIONING, OPERATION AND MAINTENANCE:

Preliminary preparations – safe sequence – risk of plant and equipment– safety documentation – field quality and safety - personal protective equipment – safety clearance notice – safety precautions – safeguards for operator's safety.

UNIT-V

ELECTRICAL SAFETY IN HAZARDOUS AREAS :

Hazardous zones – class 0,1 and 2 – spark, flashovers and corona discharge and functional requirements – Specifications of electrical plants, equipments for hazardous locations – Classification of equipment enclosure for various hazardous gases and vapours – classification of equipment/enclosure for hazardous locations.

SAFETY MANAGEMENT OF ELECTRICAL SYSTEMS :

Principles of Safety Management, Management Safety Policy, Safety organization, safety auditing, Motivation to managers, supervisors, employees.

TEXT BOOK:

1. S. Rao, Prof. H.L. Saluja, "Electrical Safety, Fire Safety Engineering and Safety Management", Khanna Publishers, New Delhi, 1988.

REFERENCE BOOKS:

1. Pradeep Chaturvedi, "Energy Management Policy, Planning and Utilization", Concept Publishing company, New Delhi, 1997.

2. www.apeasternpower.com/downloads/elecact2003.pdf

Course Outcomes:

Students will be able to understand

1. Self protect from electrical faults
2. Steps to follow while electrical accidents
3. Do's and Dont's of electrical safety.
4. Safety during installation.
5. Safety clearance at work place.
6. Safety at hazardous locations

Usha Rama College of Engineering and Technology

Electrical and Electronics Engineering

Course Structure (UR-19)

FIRST SEMESTER (I -YEAR)

I SEMESTER								
S. No	**Course Category**	**Course Code**	**Course Name**	**L**	**T**	**P**	**Contact Hrs./wk**	**C**
1	HMC	UR19HM101	Communicative English	2	0	0	2	2
2	BSC	UR19BSC105	Linear Algebra & Calculus	3	1	0	4	4
3	BSC	UR19BSC102	Applied Physics	3	0	0	3	3
4	ESC	UR19ESC106	Fundamentals of Computer Science	3	0	0	3	3
5	ESC	UR19ESC104	Engineering Graphics & Drafting	1	0	3	4	2.5
6	BSC	UR19BSCL103	Applied Physics Lab	0	0	3	3	1.5
7	ESC	UR19ESCL102	Engineering Workshop and IT Workshop	0	0	3	3	1.5
8	HSMC	UR19HML101	Communicative English Lab	0	0	2	2	1
MANDATORY COURSE								
9	BSC	UR19BSCL104	Applied Physics-Virtual Lab*	0	0	0	2	0
			Total	12	1	11	26	18.5
*Internal evaluation								

SECOND SEMESTER (I -YEAR)

II SEMESTER								
S. No	**Course Category**	**Course Code**	**Course Name**	**L**	**T**	**P**	**Contact Hrs./wk**	**C**
1	HMC	UR19HMC202	Professional English	2	0	0	2	2
2	BSC	UR19BSC208	Differential Equations & Vector Calculus	3	0	0	3	3
3	BSC	UR19BSC204	Applied Chemistry	3	0	0	3	3
4	ESC	UR19ESC207	Problem Solving & Programming Using C	3	0	0	3	3
5	ESC	UR19BSC109	Numerical Methods and Transforms	3	0	0	3	3
6	ESC	UR19ESC209	Electrical Circuit Analysis-I	3	0	0	3	3
7	ESC	UR19ESCL201	Problem Solving & Programming Using C Lab	0	0	3	3	1.5
8	BSC	UR19BSCL206	Applied Chemistry Lab	0	0	3	3	1.5
9	HMC	UR19HML202	Professional English Lab	0	0	3	3	1.5
			MANDATORY COURSES					
10	MC	UR19MC200	Engineering Exploration Project*	0	0	0	1	0
11	MC	UR19MC203	Constitution of India	0	0	0	2	0
			Total	17	0	9	29	21.5
*Internal evaluation								

THIRD SEMESTER (II-YEAR)

III SEMESTER								
S. No	**Course Category**	**Course Code**	**Course Name**	**L**	**T**	**P**	**Contact Hrs./wk**	**C**
1	PCC	UR19PCEE301	Electrical Machines-I	3	1	0	4	4
2	PCC	UR19PCEE302	Electrical Circuit Analysis-II	3	0	0	3	3
3	PCC	UR19PCEE303	Electromagnetic Field	2	1	0	3	3
4	PCC	UR19PCEE304	Electronic Devices and Circuits	3	0	0	3	3
5	PCC	UR19PCEE305	Thermal and Hydro Prime Movers	2	0	0	2	2
6	HMC	UR19HM306	Managerial Economics and Financial Analysis	3	0	0	3	3
7	PCC	UR19PCEEL301	Electrical Circuit and Simulation Lab	0	0	3	3	1.5
8	PCC	UR19PCEEL302	Thermal and Hydro Lab	0	0	3	3	1.5
	MANDATORY COURSE							
9	MC	UR19MC301	Environmental Studies	0	0	0	2	0
			Total	16	2	6	26	21
Employability Skills- I*							2	0
*Internal evaluation								

FOURTH SEMESTER (II-YEAR)

IV SEMESTER								
S. No	**Course Category**	**Course Code**	**Course Name**	**L**	**T**	**P**	**Contact Hrs./wk**	**C**
1	PCC	UR19PCEE401	Electrical Machines-II	3	1	0	4	4
2	PCC	UR19PCEE402	Power Systems-I	3	0	0	3	3
3	PCC	UR19PCEE403	Control Systems	2	1	0	3	3
4	PCC	UR19PCEE404	Switching Theory and Logic Design	2	1	0	3	3
5	PCC	UR19PCEE405	Electrical Measurements	3	0	0	3	3
6	PCC	UR19PCEEL401	Electrical Machines-I Lab	0	0	3	3	1.5
7	PCC	UR19PCEEL402	Electronic Devices and Circuits Lab	0	0	3	3	1.5
MANDATORY COURSES								
1	MC	UR19MC401	Professional Ethics and Human Values	0	0	0	2	0
2	PROJ	UR19MPROJEE401	Socially Relevant Mini Project	0	0	0	2	0
			Total	14	2	6	26	19
Self Learning *(Technical Certificate)							1	0
*Internal evaluation								

FIFTH SEMESTER (III-YEAR)

V SEMESTER								
S. No	**Course Category**	**Course Code**	**Course Name**	**L**	**T**	**P**	**Contact Hrs./wk**	**C**
1	PCC	UR19PCEE501	Linear and Digital IC Applications	3	0	0	3	3
2	PCC	UR19PCEE502	Power Systems-II	3	0	0	3	3
3	PCC	UR19PCEE503	Power Electronics	3	0	0	3	3
4	PCC	UR19PCEE504	Signals and Systems	3	0	0	3	3
Professional Elective – I								
5	PEC	UR19PEEE501	Industrial Drives and Application	3	0	0	3	3
		UR19PEEE502	Data Base Management System					
		UR19PEEE503	Renewable Energy sources					
		UR19PEEE504	Communication Systems					
		UR19PEEE505	Computer Networks					
6	PCC	UR19PCEEL501	Electrical Machines-II Lab	0	0	3	3	1.5
7	PCC	UR19PCEEL502	Electrical Measurements Lab	0	0	3	3	1.5
8	PCC	UR19PCEEL503	Control Systems Lab	0	0	3	3	1.5
MANDATORY COURSE								
9	MC	UR19MCEEL501	Virtual Electrical Machines Lab*	0	0	2	2	0
			Total	15	0	9	26	19.5
Employability Skills- II*							2	0
Self Learning *(Technical Certificate)							2	0
*Internal evaluation								

SIXTH SEMESTER (III-YEAR)

VI SEMESTER								
S. No	**Course Category**	**Course Code**	**Course Name**	**L**	**T**	**P**	**Contact Hrs./wk**	**C**
1	PCC	UR19PCEE601	Power Systems Analysis	3	0	0	3	3
2	HMC	UR19HM 602	Management Science	3	0	0	3	3
3	PCC	UR19PCEE603	Electrical Drives	3	0	0	3	3
4	PCC	UR19PCEE604	Microprocessors and Microcontrollers	3	0	0	3	3
Professional Elective – II								
5	PEC	UR19PEEE601	Design of Electrical Apparatus	3	0	0	3	3
		UR19PEEE602	Electric Machine design					
		UR19PEEE603	Electrical Materials					
		UR19PEEE604	IOT applications to Electrical Engineering					
		UR19PEEE605	Digital Signal Processing					
6	OEC		**Open Elective-I**	3	0	0	3	3
7	PCC	UR19PCEEL601	Power Electronics Lab	0	0	3	3	1.5
8	PCC	UR19PCEEL602	Microprocessors and Microcontrollers Lab	0	0	3	3	1.5
MANDATORY COURSES								
9	MC	UR19MC601	Essence of Indian Traditional Knowledge	0	0	0	2	0
10	ESC	UR19ESCL610	Virtual Power Lab*	0	0	2	2	0
12	PROJ	UR19MPROJEE 611	Socially Relevant Mini Project	0	0	0	2	0
			Total	18	0	6	30	21
*Internal evaluation								

SEVENTH SEMESTER (IV-YEAR)

VII SEMESTER								
S. No	**Course Category**	**Course Code**	**Course Name**	**L**	**T**	**P**	**Contact Hrs./wk**	**C**
1	PCC	UR19PCEE701	Switch Gear and Protection	3	0	0	3	3
2	PCC	UR19PCEE702	Utilization of Electrical Energy	3	0	0	3	3
Professional Elective – III								
3	PEC	UR19PEEE701	Digital Control Systems	3	0	0	3	3
		UR19PEEE702	Electrical and Electronics Instrumentation					
		UR19PEEE703	Electrical Distribution System					
		UR19PEEE704	VLSI Design					
		UR19PEEE705	Cloud Computing					
Professional Elective – IV								
4	PEC	UR19PEEE706	Advanced Control Systems	3	0	0	3	3
		UR19PEEE707	Special Electrical Machines					
		UR19PEEE708	HVDC & EHV AC Transmission System					
		UR19PEEE709	Operating Systems					
		UR19PEEE710	Smart Grid					
5	OEC		**Open Elective – II**	3	0	0	3	3
7	PCC	UR19PCEEL701	Power Systems Lab	0	0	3	3	1.5
8	PCC	UR19PCEEL702	Electrical Simulation Lab	0	0	3	3	1.5
10	PROJ	UR19PROJEE711	Internship	0	0	0	0	2
11	PROJ	UR19PROJEE712	Project Stage-I (Literature Survey, Problem Identification)	0	0	3	0	1.5
			Total	15	0	9	21	21.5

EIGHT SEMESTER (IV-YEAR)

VIII SEMESTER								
S. No	**Course Category**	**Course Code**	**Course Name**	**L**	**T**	**P**	**Contact Hrs./wk**	**C**
1	PCC	UR19PCEE801	Power System Operation and Control	3	0	0	3	3
Professional Elective – V								
2	PEC	UR19PEEE801	FACTS	3	0	0	3	3
		UR19PEEE802	Power System Deregulation					
		UR19PEEE803	High Voltage Engineering					
		UR19PEEE804	Data Analytics with Python					
		UR19PEEE805	Power Quality					
3	OEC		**Open Elective – III**	3	0	0	3	3
4	PROJ	UR19PROJEE801	Project Stage-II	0	0	18	18	9
							Total	18

Total Credits = 18.5+21.5+21+19+19.5+21+21.5+18=160

List of Open Electives

Open Electives offered by the Dept. of CE

S.No.	Course Code	Open Elective-I
1	UR19OECE 601	Introduction To GIS
2	UR19OECE 602	Environmental Pollution Control
3	UR19OECE603	Conservation of Water Resources
	Course Code	**Open Elective-II**
3	UR19 OECE 701	Metro Systems and Engineering
4	UR19 OECE 702	Natural Disaster Mitigation and Management
5	UR19OECE 703	Total Quality Management
	Course Code	**Open Elective-III**
6	UR19 OECE 801	Sanitary and Public Health Engineering
7	UR19 OECE 802	Environmental and Industrial Hygiene
8	UR19OECE803	Green Buildings

Open Electives offered by the Dept. of EEE

S.No.	Course Code	Open Elective-I
1	UR19OEEE601	Neural Networks and Fuzzy Logic
2	UR19OEEE602	Linear Control Systems
3	UR19OEEE603	Electrical Safety Management
	Course Code	**Open Elective – II**
4	UR19OEEE701	Programmable Logic Controllers
5	UR19OEEE702	Energy Audit and Conservation Management
6	UR19OEEE703	Electrical Technology
	Course Code	**Open Elective – III**
7	UR19OEEE801	Non Conventional Energy Sources
8	UR19OEEE802	Industrial Electrical Operation
9	UR19OEEE803	Hybrid Electric Vehicles

Open Electives offered by the Dept. of ME

S.No.	Course Code	Open Elective-I
1	UR19OEME601	Nano Technology
2	UR19OEME602	Robotics
3	UR19OEME603	Power Plant Engineering
	Course Code	**Open Elective-II**
4	UR19OEME701	Operations Research
5	UR19OEME702	Industrial Engineering & Quality control
6	UR19-OEME703	Advanced materials
	Course Code	**Open Elective-III**
7	UR19OEME801	Optimization Techniques
8	UR19OEME802	Green Engineering systems
9	UR19OEME803	Mechatronics

Open Electives offered by the Dept. of ECE

S.No.	Course Code	Open Elective-I
1	UR19OEEC 601	Consumer Electronics
2	UR19OEEC 602	Digital Electronics
3	UR19OEEC603	Analog and Digital I.C. Applications
	Course Code	**Open Elective-II**
4	UR19OEEC 701	Embedded Systems
5	UR19OEEC 702	Internet of Things (IoT)
6	UR19OEEC703	Principles of Computer Communications and Networks
	Course Code	**Open Elective-III**
7	UR19OEEC 801	Microcontrollers
8	UR19OEEC 802	Principles of Electronic Communications
9	UR19OEEC803	Electronic Measurements and Instrumentation

Open Electives offered by the Dept. of CSE

S.No.	Course Code	Open Elective-I
1	UR19OECS601	Python Programming
2	UR19OECS602	Data Base Management Systems
3	UR19OECS603	C++ Programming
	Course Code	**Open Elective-II**
4	UR19OECS701	Distributed Computing
5	UR19OECS702	Java Programming
6	UR19OECS703	Big Data
	Course Code	**Open Elective-III**
7	UR19OECS801	Digital Forensics
8	UR19OECS802	Deep Learning
9	UR19OECS803	AI and ML Robotics

Open Electives offered by the Dept. of IT

S.No.	Course Code	Open Elective-I
1	UR19OEIT101	Data Structures
2	UR19OEIT102	Computer Graphics
3	UR19OEIT103	Data Science
	Course Code	**Open Elective – II**
4	UR19OEIT201	Operating Systems
5	UR19OEIT202	Python Programming
6	UR19OEIT203	Web Technologies
	Course Code	**Open Elective – III**
7	UR19OEIT301	Information Security
8	UR19OEIT302	Mobile Application Development
9	UR19OEIT303	Block Chain Technologies

IV Year- VII Semester **COURSE CODE: UR19PCEE701** **L T P C**
3 0 0 3

SWITCH GEAR AND PROTECTION

Internal Marks: 30
External Marks: 70

Course Objectives:

1. To provide the basic principles and operation of various types of circuit breakers.
2. To study the classification, operation and application of different types of Electromagnetic protective relays.
3. To explain protective schemes, for generator and transformers.
4. To impart knowledge of various protective schemes used for feeders and bus bars.
5. To explain the principle and operation of different types of static relays.
6. To study different types of over voltages in a power system and principles of different protective schemes for insulation co–ordination.

UNIT–I:

Circuit Breakers

Miniature Circuit Breaker(MCB)– principles of arc interruption– Restriking Voltage and Recovery voltages– Restriking phenomenon - RRRV– Average and Max. RRRV– Current chopping and Resistance switching– Oil circuit breakers– Operation of Air Blast– Vacuum and SF6 circuit breakers.

UNIT–II:

Electromagnetic Protection

Relay connection – armature relay - induction disc and induction cup relays–Torque equation - Relays classification–Instantaneous– DMT and IDMT types.

Applications of relays**:** Over current and under voltage relays– Directional relays– Differential relays and percentage differential relays– Universal torque equation.

Distance relays**:** Impedance– Reactance– Mho and offset mho relays

UNIT–III:

Generator Protection

Protection of generators against stator faults– Rotor faults and abnormal conditions– restricted earth fault and inter turn fault protection.

Transformer Protection

Protection of transformers**:** Percentage differential protection– Design of CT's ratio– Buchholz relay protection–Numerical examples.

UNIT–IV:

Feeder and Bus bar Protection

Protection of lines**:** Over current Protection schemes – PSM, TMS - Numerical examples - Carrier current and three zone distance relay using impedance relays–bus bars Differential protection.

Static and Digital Relays

Static relays**:** Static relay components– Static over current relays– Static distance relay– Micro processor based digital relays

UNIT–V:

Protection against over voltage and grounding

Over voltages in power systems– Protection against lightning over voltages– Valve type and zinc oxide lighting arresters – Grounded neutral systems–Effects of ungrounded neutral on system performance– Methods of neutral grounding**:** Solid–resistance–Reactance–Arcing grounds.

Text Books:

1. Power System Protection and Switchgear by Badari Ram and D.N Viswakarma, TMH Publications
2. Power system protection- Static Relays with microprocessor applications.by T.S. Madhava Rao, TMH

Reference Books:

1. Fundamentals of Power System Protection by Paithankar and S.R.Bhide. PHI, 2003.
2. Art & Science of Protective Relaying – by C R Mason, Wiley Eastern Ltd.
3. Protection and Switch Gear by Bhavesh Bhalja, R.P. Maheshwari, Nilesh G. Chothani, Oxford University Press, 2013

Course Outcomes:

Students will be able to

1. Understand the principles of arc interruption for application to high voltage circuit breakers of air, oil, vacuum, SF6 gas type.
2. Understand the working principle and operation of different types of electromagnetic protective relays.
3. Acquire knowledge of faults and protective schemes for high power generator and transformers.
4. Improve the ability to understand various types of protective schemes used for feeders and bus bar protection.
5. Understand different types of static relays and their applications.
6. Understand different types of over voltages and protective schemes required for insulation co–ordination.

IV Year- VII Semester **COURSE CODE: UR19PCEE702** **L T P C**
3 0 0 3

UTILIZATION OF ELECTRICAL ENERGY

Internal Marks: 30
External Marks: 70

Course Objectives:

1. To understand the operating principles and characteristics of traction motors with respect to speed, temperature, loading conditions.
2. To acquaint with the different types of heating and welding techniques.
3. To study the basic principles of illumination and its measurement.
4. To understand different types of lightning system including design.
5. To understand the basic principle of electric traction including speed–time curves of different traction services.
6. To understand the method of calculation of various traction system for braking,

UNIT – I:
Selection of Motors
Choice of motor, type of electric drives, starting and running characteristics–Speed control–Temperature rise–Applications of electric drives–Types of industrial loads–continuous–Intermittent and variable loads–Load equalization.

UNIT – II:
Electric Heating

Principle of heating – modes of heat transfer Advantages and methods of electric heating–Resistance heating induction heating and dielectric heating – Arc furnaces – Direct and indirect arc furnaces

Electric Welding
Principles of welding – types of welding**-** Resistance and arc welding–Electric welding equipment–Comparison between AC and DC Welding

UNIT – III:
Illumination fundamentals
Introduction–Laws of illumination–Polar curves–Integrating sphere–Lux meter–Discharge lamps, MV and SV lamps – Lumen or flux method of calculation - Sources of light.

UNIT – IV:

Various Illumination Methods

Tungsten filament lamps- Fluorescent tubes- Comparison between tungsten filament lamps and fluorescent tubes–Basic principles of light control– Lighting systems –High Pressure Mercury Vapour lamps- Neon lamps –-Design of lighting and flood lighting–LED lighting Conservation of energy.- illumination calculations.

UNIT – V:

Electric Traction

System of electric traction and track electrification– Review of existing electric traction systems in India– Special features of traction motor– Mechanics of train movement–Speed– time curves for different services – Trapezoidal and quadrilateral speed time curves-High speed transportation trains. Modern traction motors.

Text Books:

1. Utilization of Electric Energy – by E. Openshaw Taylor, Orient Longman.
2. Art & Science of Utilization of electrical Energy – by Partab, Dhanpat Rai & Sons.

Reference Books:

1. Utilization of Electrical Power including Electric drives and Electric traction – by N.V.Suryanarayana, New Age International (P) Limited, Publishers, 1996.
2. Generation, Distribution and Utilization of electrical Energy – by C.L. Wadhwa, New Age International (P) Limited, Publishers, 1997.

Course Outcomes:

Students will be able to

1. Identify a suitable motor for electric drives and industrial applications
2. Identify most appropriate heating or welding techniques for suitable applications.
3. Understand various level of illuminosity produced by different illuminating sources.
4. Estimate the illumination levels produced by various sources and recommend the most efficient illuminating sources and should be able to design different lighting systems by taking inputs and constraints in view.
5. Determine the speed/time characteristics of different types of traction motors.
6. Estimate energy consumption levels at various modes of operation.

IV Year- VII Semester **COURSE CODE: UR19PEEE701** **L T P C**
3 0 0 3

DIGITAL CONTROL SYSTEMS
(Professional Elective-III)

Internal Marks: 30
External Marks: 70

Course Objectives:

1. To understand the concepts of digital control systems and assemble various components associated with it. Advantages compared to the analog type.
2. The theory of z–transformations and application for the mathematical analysis of digital control systems.
3. To represent the discrete–time systems in state–space model and evaluation of state transition matrix.
4. To examine the stability of the system using different tests.

UNIT – I:
Introduction and signal processing
Introduction to analog and digital control systems – Advantages of digital systems – Typical examples – Signals and processing – Sample and hold devices – Sampling theorem and data reconstruction – Frequency domain characteristics of zero order hold.

UNIT–II:
Z–transformations
Z–Transforms – Theorems – Finding inverse z–transforms – Formulation of difference equations and solving – Block diagram representation – Pulse transfer functions and finding open loop and closed loop responses.

UNIT–III:
State space analysis and the concepts of Controllability and observability
State Space Representation of discrete time systems – State transition matrix and methods of evaluation – Discretization of continuous – Time state equations – Concepts of controllability and observability – Tests (without proof).

UNIT – IV:
Stability analysis
Mapping between the S–Plane and the Z–Plane – Primary strips and Complementary Strips – Stability criterion – Modified routh's stability criterion and jury's stability test.

UNIT – V:
Design of discrete–time control systems by conventional methods
Transient and steady state specifications – Design using frequency response in the w–plane for lag and led compensators – Root locus technique in the z– plane.

State feedback controllers:
Design of state feedback controller through pole placement – Necessary and sufficient conditions – Ackerman's formula.

Text Book:
1. Discrete–Time Control systems – K. Ogata, Pearson Education/PHI, 2nd Edition

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

Course Outcomes:
Students will be

1. Able to learn the advantages of discrete time control systems and the "know how" of various associated accessories.
2. Able to understand z–transformations and their role in the mathematical analysis of different systems(like laplace transforms in analog systems).
3. Understand the stability criterion for digital systems and methods adopted for testing the same are explained.
4. Understand conventional and state–space methods of design are also introduced.
5. Able to experience the conventional method of analyzing digital control systems in the w–plane.
6. Able to study the design of state feedback control by "the pole placement method."

IV Year- VII Semester **COURSE CODE: UR19PEEE702** **L T P C**
3 0 0 3

ELECTRICAL AND ELECTRONICS INSTRUMENTATION
(Professional Elective-III)

Internal Marks: 30
External Marks: 70

Course Objectives:

1. To study various types of signals and their representation.
2. To study various types of transducers: Electrical, Mechanical, Electromechanical, Optical etc.
3. To study and measure the various types of Non–electrical quantities.
4. To study various types of digital voltmeters
5. To study the working principles of various types of oscilloscopes and their applications.
6. To study various types of signal analyzers.

UNIT–I:
Signals and their representation
Measuring Systems, Performance Characteristics, – Static characteristics – Dynamic Characteristics – Errors in Measurement – Gross Errors – Systematic Errors – Statistical analysis of random errors – Signal and their representation – Standard test, periodic, aperiodic, modulated signal – Sampled data pulse modulation and pulse code modulation.

UNIT–II:
Transducers
Definition of transducers – Classification of transducers – Advantages of Electrical transducers – Characteristics and choice of transducers – Principle operation of resistor, inductor, LVDT and capacitor transducers – LVDT Applications – Strain gauge and its principle of operation – Guage factor – Thermistors – Thermocouples – Synchros – Piezo electric transducers – Photo diodes.

UNIT–III:
Measurement of Non–Electrical Quantities
Measurement of strain – Gauge Sensitivity – Displacement – Velocity – Angular Velocity – Acceleration – Force – Torque – Measurement of Temperature, Pressure, Vacuum, Flow, Liquid level.

UNIT–IV:
Digital Voltmeters
Digital voltmeters – Successive approximation, ramp, dual–Slope integration continuous balance type – Micro processor based ramp type – DVM digital frequency meter – Digital phase angle meter.

UNIT–V:

Oscilloscope

Cathode ray oscilloscope – Time base generator – Horizantal and vertical amplifiers – Measurement of phase and frequency – Lissajous patterns – Sampling oscilloscope – Analog and digital type data loger – Transient recorder.

Signal Analyzers

Wave Analyzers – Frequency selective analyzers – Heterodyne – Application of Wave analyzers – Harmonic Analyzers – Total Harmonic distortion – Spectrum analyzers – Basic spectrum analyzers – Spectral displays – Vector impedance meter – Q meter – Peak reading and RMS voltmeters.

Text Books:

1. D. V. S Murthy, "Transducers and Instrumentation", Prentice Hall of India, 2nd edition, 2009.
2. K. Sawhney, "A course in Electrical and Electronic Measurements and Instrumentation", Dhanpatrai & Co., 12th edition, 2010.

Reference Books:

1. D O Doeblin, "Measurements Systems, Applications and Design", TMH Publications, 5th edition, 2003.
2. D Helfrick and W. D. Cooper, "Modern Electronic Instrumentation and Measurement techniques", Pearson/Prentice Hall of India, 12th edition, 2010.
3. S Morris, "Principles of Measurement and Instrumentation", Pearson /Prentice Hall of India, 2nd edition, 1994.
4. H. S. Kalsi, "Electronic Instrumentation", Tata McGraw-Hill Edition, 1995, 1st edition, 1995

Course Outcomes:

Students will be

1. Able to represent various types of signals.
2. Acquire proper knowledge to use various types of Transducers.
3. Able to monitor and measure various parameters such as strain, velocity, temperature, pressure.
4. Acquire proper knowledge and working principle of various types of digital voltmeters.
5. Able to measure various parameter like phase and frequency of a signal with the help of CRO.
6. Acquire proper knowledge and able to handle various types of signal analyzers.

IV Year- VII Semester **COURSE CODE: UR19PEEE703** **L T P C**
3 0 0 3

ELECTRICAL DISTRIBUTION SYSTEMS
(Professional Elective-III)

Internal Marks: 30
External Marks: 70

Course Objectives

1. To study different factors of Distribution system.
2. To study and design the substations and distribution systems.
3. To study the concepts of voltage drop and power loss.
4. To study the distribution system protection and its coordination.
5. To study the effect of compensation for power factor improvement.
6. To study the effect of voltage control on distribution system.

UNIT – I:
General Concepts
Introduction to distribution systems, Load modeling and characteristics – Coincidence factor– Contribution factor loss factor – Relationship between the load factor and loss factor – Classification of loads (Residential, commercial, Agricultural and Industrial) – Numerical problems.

UNIT – II:
Substations
Location of substation- Rating of distribution substation – Service area with'n'primary feeders – Benefits and methods of optimal location of substations.

Distribution Feeders
Primary distribution- Radial and loop types of primary feeders –Voltage levels – Feeder loading – Basic design practice of the secondary distribution system.

UNIT – III:
System Analysis
Voltage drop and power–loss calculations**:** Derivation for voltage drop and power loss in lines – Uniformly distributed loads and non-uniformly distributed loads – Numerical problems.

UNIT – IV:
Protection
Objectives of distribution system protection – Types of common faults and procedure for fault calculations for distribution system.
Protective devices**:** Principle of operation of fuses– Circuit reclosures – Line sectionalizes and circuit breakers- Residual Current Circuit Breaker.

Coordination **:** General coordination procedure –Various types of coordinated operation of protective devices.

UNIT – V:

Compensation for Power Factor Improvement

Capacitive compensation for power factor control – Different types of power capacitors – shunt and series capacitors – Effect of shunt capacitors (Fixed and switched) – Power factor correction – Capacitor allocation – Procedure to determine the best capacitor location.

Voltage Control

Equipment for voltage control – Effect of series capacitors – Effect of AVB/AVR – Line drop compensation – Numerical problems.

Text Book:

1. "Electric Power Distribution system, Engineering" – by Turan Gonen, McGraw–hill Book Company.

Reference Books:

1. Electrical Distribution Systems by Dale R.Patrick and Stephen W.Fardo, CRC press
2. Electric Power Distribution – by A.S. Pabla, Tata McGraw–hill Publishing company, 4th edition, 1997.
3. Electrical Power Distribution Systems by V.Kamaraju, Right Publishers.

Course Outcomes:

Students will be able to

1. Determine the voltage drop and power loss
2. Understand the protection and its coordination.
3. Understand the effect of compensation forp.f improvement.
4. Understand the effect of voltage control.
5. Understand various factors of distribution system.
6. Design the substation and feeders.

IV Year- VII Semester **COURSE CODE: UR19PEEE704** **L T P C**
3 0 0 3

VLSI DESIGN
(Professional Elective-III)

Internal Marks: 30
External Marks: 70

Course Objectives

1. To study MOS transistors.
2. To study logic circuit of MOS.
3. To design sequential circuits.
4. To design memory and array structures
5. To test architecture at various levels.

UNIT I INTRODUCTION TO MOS TRANSISTOR

MOS Transistor, CMOS logic, Inverter, Pass Transistor, Transmission gate, Layout Design Rules, Gate Layouts, Stick Diagrams, Long-Channel I-V Charters tics, C-V Charters tics, Non ideal I-V Effects, DC Transfer characteristics, RC Delay Model, Elmore Delay, Linear Delay Model, Logical effort, Parasitic Delay, Delay in Logic Gate, Scaling.

UNIT II COMBINATIONAL MOS LOGIC CIRCUITS

Circuit Families: Static CMOS, Ratioed Circuits, Cascode Voltage Switch Logic, Dynamic Circuits, Pass Transistor Logic, Transmission Gates, Domino, Dual Rail Domino, CPL, DCVSPG, DPL, Circuit Pitfalls. Power: Dynamic Power, Static Power, Low Power Architecture.

UNIT III SEQUENTIAL CIRCUIT DESIGN

Static latches and Registers, Dynamic latches and Registers, Pulse Registers, Sense Amplifier Based Register, Pipelining, Schmitt Trigger, Monostable Sequential Circuits, Astable Sequential Circuits.
Timing Issues : Timing Classification Of Digital System, Synchronous Design.

UNIT IV DESIGN OF ARITHMETIC BUILDING BLOCKS AND SUBSYSTEM

Arithmetic Building Blocks: Data Paths, Adders, Multipliers, Shifters, ALUs, power and speed tradeoffs, Case Study: Design as a tradeoff. Designing Memory and Array structures: Memory Architectures and Building Blocks, Memory core, memory circuitry.

UNIT V IMPLEMENTATION STRATEGIES AND TESTING

FPGA Building Block Architectures, FPGA Interconnect Routing Procedures. Design for Testability: Ad Hoc Testing, Scan Design, BIST, IDDQ Testing, Design for Manufacturability, Boundary Scan.

Text Book:

1. VLSI Design : A Circuits and Systems Perspective by Neil H.E. Weste, David Harris, Ayan Banerjee. PHI Publisher.

Reference Book:

1. VLSI Design by K Lal kishore and VSV Prabhaker, IK international publisher

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Course Outcomes:

Students will be able to

1. Understand MOS transistors.
2. Understand logic circuit of MOS.
3. Design sequential circuits.
4. Design memory and array structures
5. Test architecture at various levels.
6. Understand complete architecture usage.

IV Year- VII Semester **COURSE CODE: UR19PEEE705** **L T P C**
3 0 0 3

CLOUD COMPUTING
(Professional Elective-III)

Internal Marks: 30
External Marks: 70

Course Objectives

1. To study basics of cloud computing.
2. To study local area network LAN.
3. To apply data link layer.
4. To study medium access layer CSMA/CA
5. To study congestion control and quality of service.

UNIT I: Introduction

Introduction to computer networks, evolution of computer networks and its uses, Advantages and Disadvantages of Computer Network, reference models: OSI reference Models, TCP/IP Protocol Suit Networking fundamentals: Internet, Circuit switching vs Packet switching, ISPs, Delay and Loss in Packet Switched Networks

UNIT II: Local Area Network

LAN Architecture, LAN topologies- Bus/ Tree LAN, Ring LAN, Star LAN, Wireless LAN, Ethernet and Fast Ethernet, Token Ring

UNIT III: Application layer and data link layer

Application Layer Protocols: HTTP, FTP, SMTP, DNS
Data link layer design issues, Flow Control- Stop and Wait, Error Detection, Error Control, error detection and correction, data link layer protocols, sliding window protocols, example of data link protocol- HDLC

UNIT IV: Medium access layer

Channel allocation problem, multiple access protocols, Introduction to ALOHA, CSMA/CD, CSMA/CA

UNIT V: The network layer

Introduction, Routers, Network layer concepts, shortest path routing, flooding, distance vector routing, link state routing (without algorithms), congestion control and quality of service, internetworking, IP, Ipv4 Addressing vs Ipv6

Text Books:

1.Data Communication & networking: Forouzan, B. A.

2. Data and Computer Communications, W. Stallings, Prentice Hall of India

Reference Book:

1.Computer Networks: Tanenbaum, Andrew S, Prentice Hall

Course Objectives

Students will be able to

1. Understand basics of cloud computing.
2. Understand local area network LAN.
3. Apply data link layer and check various applications.
4. Understand medium access layer CSMA/CA
5. Understand quality of service of network layers.
6. Understand various IP address.

IV Year- VII Semester **COURSE CODE: UR19PEEE706** **L T P C**
3 0 0 3

ADVANCED CONTROL SYSTEMS
(Professional Elective-IV)

Internal Marks: 30
External Marks: 70

Course Objectives

1. To introduce the concepts of open loop and closed loop systems, mathematical models of Mechanical and electrical systems, and concepts of feedback
2. To study the characteristics of the given system in terms of the transfer function and introducing various approaches to reduce the overall system for necessary analysis
3. To develop the acquaintance in analyzing the system response in time-domain and frequency domain in terms of various performance indices
4. To analyze the system in terms of absolute stability and relative stability by different Approaches

UNIT – I:
State space analysis
State Space Representation, Solution of State Equation, State Transition Matrix, Canonical Forms –Controllable Canonical Form, Observable Canonical Form, Jordan Canonical Form.

UNIT – II:
Controllability, observability and design of pole placement
Tests for controllability and observability for continuous time systems – Time varying case – Minimum energy control – Time invariant case – Principle of duality – Controllability and observability form Jordan canonical form and other canonical forms – Effect of state feedback on controllability and observability

UNIT – III:
Multi input multi output(MIMO) system
Models of MIMO system, matrix representation, transfer function representation, poles and zeros, decoupling, introduction to multi variable Nyquist plot and singular values analysis

UNIT – IV:
Describing function analysis
Introduction to nonlinear systems, Types of nonlinearities, describing functions, Introduction to phase-plane analysis.

UNIT-V:

Stability analysis

Stability in the sense of Liapunov, Lyapunov's stability and Lypanov's instability theorems. Direct method of Lypanov for the Linear and Nonlinear continuous time autonomous systems.

Optimal control

Linear quadratic optimal regulator (LQR) problem formulation – Optimal regulator design by parameter adjustment (Lyapunov method) – Optimal regulator design by continuous time algebraic riccatti equation (CARE) - Optimal controller design using LQG framework..

Text Book

1.I.J.Nagarath and M.Gopal, " **Control System Engineering,"** New Age International Publishers, Fifth Edition

Reference Books

1. Katsuhiko Ogata, "Modern Control Engineering," Pearson, Fifth Edition
2. S. Salivahanan, R. Rengaraj, and G. R. Venkata Krishnan, " Control Systems Engineering," Pearson, First Impression
3. Benjamin C. Kuo, Frarid Golnaraghi, " Automatic Control Systems," Wiley Student Edition, Eigth Edition
4. PadmaRaju and Reddy , " Instrumentation and Control Systems ", McGrawHill Education ,2016

Course Outcomes:

Students will be able to

1. Understand concepts of feedback and its advantages to various control systems
2. Understand performance metrics to design the control system in time-domain and frequency domain are introduced.
3. Understand Control systems for various applications can be designed using time-domain and frequency Domain analysis.
4. Understand the conventional approach, the state space approach for the analysis of control systems is also introduced.
5. Design different control systems for different applications as per given specifications
6. Understand concepts of state variable analysis, design and also the concepts of controllability and Observability

IV Year- VII Semester **COURSE CODE: UR19PEEE707** **L T P C**
3 0 0 3

SPECIAL ELECTRICAL MACHINES
(Professional Elective-IV)

Internal Marks: 30
External Marks: 70

Course Objective:

1. To explain theory of operation and control of switched reluctance motor.
2. To explain the performance and control of stepper motors, and their applications.
3. To describe the operation and characteristics of permanent magnet dc motor.
4. To distinguish between brush dc motor and brush less dc motor**.**
5. To explain the theory of travelling magnetic field and applications of linear motors.
6. To understand the significance of electrical motors for traction drives.

UNIT I:
Switched Reluctance Motor
Principle of operation – Design of stator and rotor pole arc – Power converter for switched reluctance motor – Control of switched reluctance motor.

UNIT II:
Stepper Motors
Construction – Principle of operation – Theory of torque production – Hybrid stepping motor – Variable reluctance stepping motor – Open loop and closed loop control.

UNIT III:
Permanent Magnet DC Motors
Construction – Principle of working – Torque equation and equivalent circuits – Performance characteristics – Moving coil motors.

UNIT IV:
Permanent Magnet Brushless DC Motor
Construction – Principle of operation – Theory of brushless DC motor as variable speed synchronous motor – Sensor less and sensor based control of BLDC motors.

UNIT V:
Linear motors
Linear induction motor: Construction– principle of operation– applications. Linear synchronous motor: Construction – principle of operation– applications.

Electric Motors for traction drives

AC motors– DC motors –Single sided linear induction motor for traction drives – Comparison of AC and DC traction.

Text Book:

1. Special electrical Machines, K.Venkata Ratnam, University press, 2009, New Delhi.

Reference Books:

1. Brushless Permanent magnet and reluctance motor drives, Clarenden press, T.J.E. Miller, 1989, Oxford.
2. Special electrical machines, E.G. Janardhanan, PHI learning private limited, 2014.

Course Outcomes:

The student should be able to

1. Understand theory of operation and control of switched reluctance motor.
2. Understand the performance and control of stepper motors, and their applications.
3. Understand the operation and characteristics of permanent magnet dc motor.
4. Understand between brush dc motor and brush less dc motor**.**
5. Understand the theory of travelling magnetic field and applications of linear motors.
6. Understand the significance of electrical motors for traction drives.

IV Year- VII Semester **COURSE CODE: UR19PEEE708** **L T P C**
3 0 0 3

HVDC & EHVAC TRANSMISSION SYSTEM
(Professional Elective-IV)

Internal Marks: 30
External Marks: 70

Course Objectives:

1. To understand the phenomena associated with transmission line, operating at extra high voltages. The unit gives detail analysis of several phenomena viz. electrostatic field, charges, voltage gradient and conductor configuration.
2. The objective is to discuss phenomena of corona, losses, audible noise, radio interference and measurement of these quantities.
3. To understand the phenomena of HVDC, HVDC equipment comparison with AC and the latest state of art in HVDC transmission.
4. To understand method of conversion of AC to DC, performance of various level of pulse conversion and control characteristics of conversion. It also provides knowledge of effect of source inductance as well as method of power control.
5. To understand the requirements of reactive power control and filtering technique in HVDC system.

UNIT – I:
Introduction of EHV AC transmission
Necessity of EHV AC transmission – Advantages and problems – Power handling capacity and line losses – Mechanical considerations – Resistance of conductors –Electrostatics – Field of sphere gap – Field of line charges and properties – Charge ~ potential relations for multi–conductors – Surface voltage gradient on conductors – Bundle spacing and bundle radius – Examples – Distribution of voltage gradient on sub conductors of bundle – Examples.

UNIT – II:
Corona effects
Power loss and audible noise (AN) – Corona loss formulae – Charge voltage diagram – Generation – Characteristics – Limits and measurements of AN – Relation between 1–phase and 3–phase AN levels – Examples – Radio interference (RI) – Corona pulses generation – Properties and limits – Frequency spectrum – Modes of propagation – Excitation function – Measurement of RI, RIV and excitation functions – Examples.

UNIT – III:
Basic Concepts of DC Transmission
Economics & Terminal equipment of HVDC transmission systems**:** Types of HVDC Links – Apparatus required for HVDC Systems – Comparison of AC &DC transmission – Application of DC Transmission System – Planning & Modern trends in DC transmission.

UNIT – IV:

Analysis of HVDC Converters and System Control

Choice of Converter configuration – Analysis of Graetz – Characteristics of 6 Pulse & 12 Pulse converters – Cases of two 3 phase converters in star – Star mode and their performance – Principal of DC Link Control – Converters Control Characteristics – Firing angle control – Current and extinction angle control – Effect of source inductance on the system – Starting and stopping of DC link – Power Control.

UNIT–V:

Reactive Power Control in HVDC

Reactive Power Requirements in steady state – Conventional control strategies –Alternate control strategies sources of reactive power – AC Filters – Shunt capacitors – Synchronous condensers.

Text Books:

1. HVDC Power Transmission Systems: Technology and system Interactions – by K.R.Padiyar, New Age International (P) Limited, and Publishers.
2. Direct Current Transmission – by E.W.Kimbark, John Wiley & Sons.
3. EHVAC Transmission Engineering by R. D. Begamudre, New Age International (P) Ltd.

Reference Books:

1. EHVAC and HVDC Transmission Engineering and Practice – S.Rao.
2. Power Transmission by Direct Current – by E.Uhlmann, B.S.Publications
3. HVDC Transmission – J. Arrillaga.

Course Outcomes:

Students will be able to

1. Understand HV transmission system with regard to power handling capacity.
2. Determining corona, radio interference, audible noise generation and frequency spectrum for single and three phase transmission lines.
3. Acquire knowledge in transmission of HVDC power with regard to terminal equipments, type of HVDC connectivity and planning of HVDC system.
4. Understand choice of pulse conversion, control characteristic, firing angle control and effect of source impedance.
5. Develop knowledge on reactive power requirements of conventional control, filters and reactive power compensation in AC. side of HVDC system.
6. Calculate voltage and current harmonics, and design of filters for six and twelve pulse conversion.

IV Year- VII Semester **COURSE CODE: UR19PEEE709**

L	T	P	C
3	0	0	3

OPERATING SYSTEMS
(Professional Elective-IV)

Internal Marks: 30
External Marks: 70

COURSE OBJECTIVES:

1. To explain main components of OS and their working
2. To familiarize the operations performed by OS as a resource Manager
3. To impart various scheduling policies of OS
4. To teach the different memory management techniques.

UNIT - I

OPERATING SYSTEMS OVERVIEW: Introduction, operating system operations, process management, memory management, storage management, protection and security, distributed systems.

OPERATING SYSTEMS STRUCTURES: Operating system services and systems calls, system programs, operating system structure, operating systems generations.

UNIT - II

PROCESS MANAGEMENT: Process concepts, process state, process control block, scheduling queues, process scheduling, multithreaded programming, threads in UNIX, comparison of UNIX and windows.

CONCURRENCY AND SYNCHRONIZATION: Process synchronization, critical section problem, Peterson's solution, synchronization hardware, semaphores, classic problems of synchronization, readers and writers problem, dining philosophers problem, monitors, synchronization examples(Solaris), atomic transactions. Comparison of UNIX and windows.

UNIT - III

DEADLOCKS: System model, deadlock characterization, deadlock prevention, detection and avoidance, recovery from deadlock banker's algorithm.

MEMORY MANAGEMENT: Swapping, contiguous memory allocation, paging, structure of the page table, segmentation, virtual memory, demand paging, page-replacement algorithms, allocation of frames, thrashing, case study - UNIX.

UNIT IV

FILE SYSTEM: Concept of a file, access methods, directory structure, file system mounting, file sharing, protection. File system implementation: file system structure, file system implementation, directory implementation, allocation methods, free-space management, efficiency and performance, comparison of UNIX and windows.

UNIT - V

I/O SYSTEM: Mass storage structure - overview of mass storage structure, disk structure, disk

attachment, disk scheduling algorithms, swap space management, stable storage implementation, tertiary storage structure.
I/O: Hardware, application I/O interface, kernel I/O subsystem, transforming I/O requests to hardware operations, streams, performance.

TEXT BOOK:
1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne (2006), Operating System Principles, 7th edition, Wiley India Private Limited, New Delhi.

REFERENCE BOOKS:
1. Stallings (2006), Operating Systems, Internals and Design Principles, 5th edition, Pearson Education, India.
2. Andrew S. Tanenbaum (2007), Modern Operating Systems, 2nd edition, Prentice Hall of India
3. Deitel & Deitel (2008), Operating systems, 3rd edition, Pearson Education, India.

COURSE OUTCOMES:
Students will be able to:
1. Understand various concepts and features of Operating systems.
2. Understand various operating systems with respect to characteristics and features
3. Understand algorithm of CPU Scheduling, Memory Scheduling and disk scheduling.
4. Understand changes in the OS configurations as per need.
5. Understand OS systems I/O.
6. Understand file systems and memory management.

IV Year- VII Semester **COURSE CODE: UR19PEEE710** **L T P C**
3 0 0 3

SMART GRID
(Professional Elective-IV)

Internal Marks: 30
External Marks: 70

COURSE OBJECTIVES:

1. Smart Grid technologies, different smart meters and advanced metering infrastructure.
2. The power quality management issues in Smart Grid.
3. The high performance computing for Smart Grid applications.

UNIT I INTRODUCTION TO SMART GRID

Evolution of Electric Grid, Concept, Definitions and Need for Smart Grid, Smart grid drivers, functions, opportunities, challenges and benefits, Difference between conventional & Smart Grid, National and International Initiatives in Smart Grid.

UNIT II SMART GRID TECHNOLOGIES

Technology Drivers, Smart energy resources, Smart substations, Substation Automation, Feeder Automation ,Transmission systems: EMS, FACTS and HVDC, Wide area monitoring, Protection and control, Distribution systems: DMS, Volt/VAR control, Fault Detection, Isolation and service restoration, Outage management, High-Efficiency Distribution Transformers, Phase Shifting Transformers, Plugin Hybrid Electric Vehicles(PHEV).

UNIT III SMART METERS AND ADVANCED METERING

IntroductiontoSmartMeters,AdvancedMeteringinfrastructure(AMI)driversandbenefits, AMI protocols, standards and initiatives, AMI needs in the smart grid, Phasor Measurement Unit(PMU), Intelligent Electronic Devices(IED)&their application for monitoring & protection.

UNIT IV **POWER QUALITY MANAGEMENT IN SMART GRID**

Power Quality & EMC in Smart Grid, Power Quality issues of Grid connected Renewable Energy Sources, Power Quality Conditioners for Smart Grid, Web based Power Quality monitoring, Power Quality Audit.

UNIT V HIGH PERFORMANCE COMPUTING FOR SMART GRID APPLICATIONS

Local Area Network(LAN),House Area Network(HAN), Wide Area Network(WAN), Broad band over Power line(BPL),IP based Protocols, Basics of Web Service and CLOUD Computing to make Smart Grids smarter, Cyber Security for Smart Grid.

TEXT BOOKS:

1. Stuart Borlase “Smart Grid: Infrastructure, Technology and Solutions”,CRCPress2012.
2. JanakaEkanayake,NickJenkins,KithsiriLiyanage,JianzhongWu,AkihikoYokoyama, “Smart Grid: TechnologyandApplications”,Wiley2012.

REFERENCE BOOKS

1. VehbiC. Güngör ,Dilan Sahin, Taskin Kocak, Salih Ergüt, Concettina Buccella, Carlo Cecati, and Gerhard P. Hancke, “Smart Grid Technologies: Communication Technologies and Standards” IEEE Transactions On Industrial Informatics, Vol.7,No.4, November2011.
2. Xi Fang, Satyajayant Misra, Guoliang Xue, and Dejun Yang“SmartGrid –The New and Improved Power Grid: A Survey” ,IEEE Transaction on Smart Grids,vol.14,2012.
3. James Momohe “Smart Grid: Fundamentals of Design and Analysis,”, Wiley-IEEE Press , 2012.

Course Outcomes:

Students will be able to

1. Understanding on the concepts of Smart Grid and its present developments.
2. Understand different Smart Grid technologies.
3. Understand smart meters and advanced metering infrastructure.
4. Understand power quality management in Smart Grids.
5. Understanding on LAN, WAN and Cloud Computing for Smart Grid applications.
6. Understand Cyber Security for Smart Grid

IV Year- VII Semester **COURSE CODE:**

L	T	P	C
3	0	0	3

OPEN ELECTIVE-II

Internal Marks: 30
External Marks: 70

The student can choose any one Open Elective-II (OE-II) subject offered by other branches. The list of OEs are available in course structure.

IV Year- VII Semester **COURSE CODE: UR19OEEE701** **L T P C**
3 0 0 3

PROGRAMMABLE LOGIC CONTROLLERS
(Open Elective-II)

Internal Marks: 30
External Marks: 70

Course Objectives:

1. To have knowledge on PLC.
2. To acquire the knowledge on programming of PLC.
3. To understand different PLC registers and their description.
4. To have knowledge on data handling functions of PLC.

Unit I:
Introduction
PLC Basics: PLC system, I/O modules and interfacing, CPU processor, programming equipment, programming formats, construction of PLC ladder diagrams, devices connected to I/O modules.

Unit II:
PLC Programming
PLC Programming: Input instructions, outputs, operational procedures, programming examples using contacts and coils. Digital logic gates, programming in the Boolean algebra system, conversion examples. Ladder diagrams and sequence listings, ladder diagram construction.

Unit III:
Programmable Timers and Counters
Timer instructions – On delay time instruction – Off delay timer instruction – Retentive timer – Counter instructions – Up counter – Down counter - Cascading counters – Incremental encoder – Counter applications – Combining counter and timer functions.

Unit IV:
Program Control Instructions
Master control reset instruction – Jump instructions and sub routines – Immediate input and output instructions.

Unit V:
Other Instructions
Data manipulation – Data transfer operation – Data compare instruction – Data manipulation programs – Numerical data I/O interfaces – Math instructions – Addition, subtraction,multiplication & division instruction – Sequential instructions – Sequence programs – Shift registers – Word shift registers.

Applications
Control of water level indicator – Alarm monitor - Conveyor motor control – Parking garage– Ladder diagram for process control – PID controller.

Text Books:
1. Programmable logic controllers by Frank D.Petruzella- McGraw Hill – 3rd Edition.
2. Programmable Logic Controllers – Principle and Applications by John W. Webb and Ronald A. Reiss, Fifth Edition, PHI

Reference Books:
1. Programmable Logic Controllers – Programming Method and Applications by JR. Hackworth and F.D Hackworth Jr. – Pearson, 2004.
2. Introduction to Programmable Logic Controllers- Gary Dunning-Cengage Learning.
3. Programmable Logic Controllers –W.Bolton-Elsevier publisher

Course Outcomes:
Students will be able to:
1. Understand the PLCs and their I/O modules.
2. Develop control algorithms to PLC using ladder logic.
3. Manage PLC registers for effective utilization in different applications.
4. Design PID controller with PLC.
5. Know how to handle analog signal and converting of A/D in PLC.
6. Understand sequence program, shift registers.

IV Year- VII Semester **COURSE CODE: UR19OEEE702** **L T P C**
3 0 0 3

ENERGY AUDIT, CONSERVATION & MANAGEMENT
(Open Elective-II)

Internal Marks: 30
External Marks: 70

Course Objectives:

1. To understand energy efficiency, scope, conservation and technologies.
2. To design energy efficient lighting systems.
3. To estimate/calculate power factor of systems and propose suitable compensation techniques.
4. To understand energy conservation in HVAC systems.
5. To calculate life cycle costing analysis and return on investment on energy efficient technologies.

Unit–I:

Basic Principles of Energy Audit and management

Energy audit – Definitions – Concept – Types of audit – Energy index – Cost index – Pie charts –Sankey diagrams –– Energy conservation schemes– Principles of energy management – Initiating, planning, controlling, promoting, monitoring, reporting – Energy manager – Qualities and functions .

Unit–II:

Lighting

Definition of terms and units – Luminous efficiency – Polar curve – Calculation of illumination level – Illumination of inclined surface to beam – Luminance or brightness – Types of lamps – types of lightning systems- indoor / outdoor lighting- Electrical lamps – discharge / arc lamps, Sodium Vapour – High Pressure Mercury Vapour lamps ,Neon lamps – Fluorescent tubes- Design of lighting and flood lighting, Conservation of energy.- illumination calculations.
Electric lighting fittings (luminaries)–Energy conservation measures.

Unit–III:

Power Factor and energy instruments

Power factor – Methods of improvement – Location of capacitors – Power factor with non linear loads – Effect of harmonics on Power factor – Numerical problems. Energy Instruments – Watt–hour meter – Data loggers – Thermocouples – Pyrometers – Lux meters – Tong testers – Power analyzer.

Unit–IV:

Space Heating and Ventilation

Ventilation – Air–Conditioning (HVAC) and Water Heating**:** Introduction – Heating of buildings – Transfer of Heat–Space heating methods – Ventilation and air–conditioning – Insulation–Cooling load – Electric water heating systems – Energy conservation methods.

Unit–V

Economic Aspects and Financial Analysis

Understanding energy cost - Economics Analysis – Depreciation Methods – Time value of money – Cost benefit risk analysis- Present worth method – Replacement analysis – Life cycle costing analysis –Applications of life cycle costing analysis

Text Books:

1. Hand Book of Energy Audit by Sonal Desai- Tata McGraw hill
2. Energy efficient electric motors by John .C. Andreas, Marcel Dekker Inc Ltd–2nd edition, 1995

Reference Books:

1. Energy management by W.R. Murphy & G. Mckay Butter worth, Elsevier publications. 2012
2. Electric Energy Utilization and Conservation by S C Tripathy, Tata McGraw hill publishing company Ltd. New Delhi.
3. Energy management by Paul o' Callaghan, Mc–Graw Hill Book company–1st edition, 1998.
4. Energy management hand book by W.C.Turner, John wiley and sons.
5. Energy management and conservation –k v Sharma and p venkataseshaiah-I K International Publishing House pvt.ltd, 2011.

Course Outcomes:

Student will be able to

1. Understand energy efficiency, conservation and various technologies.
2. Design energy efficient lighting systems.
3. Calculate power factor of systems and propose suitable compensation techniques.
4. Understand energy conservation in HVAC systems.
5. Calculate life cycle costing analysis and return on investment on energy efficient technologies.
6. Understand cost benefit risk analysis.

IV Year- VII Semester **COURSE CODE: UR19OEEE703** **L T P C**
3 0 0 3

ELECTRICAL TECHNOLOGY
(Open Elective-II)

Internal Marks: 30
External Marks: 70

Course Objectives:

1. To know the basic principle of DC generators and motors.
2. To know the basic principle of single phase transformers.
3. To understand the basic principle of three-phase induction motor and alternators.
4. To understand the basic principle of special motors and electrical instruments.

UNIT - I

D.C Generators and DC Motors: Principle of operation of DC Machines- EMF equation – Types of generators – Magnetization and load characteristics of DC generators, DC Motors – Types of DC Motors – Characteristics of DC motors – 3-point starters for DC shunt motor – Losses and efficiency – Swinburne's test – Speed control of DC shunt motor – Flux and Armature voltage control methods.

UNIT - II

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

UNIT - III

Three Phase Induction Motor: Principle of operation of three-phase induction motors – Slip ring and Squirrel cage motors – Slip-Torque characteristics – Efficiency calculation – Starting methods.

UNIT - IV

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

UNIT - V

Special Motors & Electrical Instruments: Principle of operation - Shaded pole motors – Capacitor motors, AC servomotor, AC tachometers, Synchros, Stepper Motors – Characteristics, Basic Principles of indicating instruments – Moving Coil and Moving iron Instruments (Ammeters and Voltmeters).

TEXT BOOKS:

1. Introduction to Electrical Engineering – M.S Naidu and S. Kamakshaiah, TMH Publ.
2. Basic Electrical Engineering - T.K. Nagasarkar and M. S. Sukhija, Oxford University Press, 2005

REFERENCE BOOKS:

1. Principles of Electrical Engineering - V.K Mehta, S. Chand Publications.
2. Theory and Problems of basic electrical engineering - I.J. Nagarath and D.P Kothari, PHI Publications
3. Essentials of Electrical and Computer Engineering - David V. Kerns, JR. J. David Irwin

Course Outcomes:

Students will be able to

1. Analyze the performance of dc generators and motors.
2. Analyze the performance of transformers.
3. Understand operation of three phase induction motors.
4. Understand the performance of special motors and electrical instruments in real time applications.
5. Understand synchronous impedance method of regulation
6. Understand slip torque characteristics of induction maotor

III Year- VII Semester **COURSE CODE: UR19PCEEL701**

L	T	P	C
0	0	3	1.5

POWER SYSTEMS LAB

Internal Marks: 20
External Marks: 30

Course Objective:

1. To impart the practical knowledge of functioning of various power system components and determination of various parameters and simulation of load flows, transient stability, LFC and Economic dispatch.

List of Experiments

1. Sequence impedances of 3 phase Transformer.
2. Sequence impedances of 3 phase Alternator by Fault Analysis.
3. Sequence impedances of 3 phase Alternator by Direct method.
4. ABCD parameters of Transmission network.
5. Power Angle Characteristics of 3phase Alternator with infinite bus bars.
6. Dielectric strength of Transformer oil.
7. Calibration of Tong Tester.
8&9. Load flow studies any two methods.
10. Transient Stability Analysis
11. Load frequency control without control
12. Load frequency control with control
13. Economic load dispatch without losses
14. Economic load dispatch with losses.

Course Outcome:

1. The student is able to determine the parameters of various power system components which are frequently occur in power system studies and he can execute energy management systems functions at load dispatch centre.

Note:

Minimum 12 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations. In case if the student fails to get eligibility for semester end exams in the current semester, he/she has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted.

III Year- VII Semester **COURSE CODE: UR19PCEEL702**

L	T	P	C
0	0	3	1.5

ELECTRICAL SIMULATION LAB

Internal Marks: 20
External Marks: 30

Course Objectives:

1.To simulate integrator circuit, differentiator circuit, Boost converter, Buck converter, full convertor and PWM inverter.
2.To simulate transmission line by incorporating line, load and transformer models.
3.To perform transient analysis of RLC circuit and single machine connected to infinite bus (SMIB).
4.To find load flow solution for a transmission network with Newton– Rampson method.

List of Experiments

1. Simulation of transient response of RLC circuits
    a. Response to pulse input
    b. Response to step input
    c. Response to sinusoidal input
2. Analysis of three phase circuit representing the generator transmission line and load. Plot three phase currents & neutral current.
3. Simulation of single–phase full converter using RLE loads and single phase AC voltage controller using RL loads.
4. Plotting of Bode plots for the transfer functions of systems up to 5th order.
5. Power system load flow using Newton–Raphson technique.
6. Simulation of Boost and Buck converters.
7. Integrator & Differentiator circuits using op–amp.
8. Simulation of D.C separately excited motor using transfer function approach.
9. Plotting of root locus for the transfer functions of systems up to 5th order
10. Plotting of nyquist plots for the transfer functions of systems up to 5th order

Any 2 of the following experiments are to be conducted:

1. Modeling of transformer and simulation of lossy transmission line.
2. Simulation of single phase inverter with PWM control.
3. Simulation of three phase full converter using MOSFET and IGBTs.
4. Transient analysis of single machine connected to infinite bus (SMIB).

Course Outcomes:

1. Able to simulate integrator circuit, differentiator circuit, Boost converter, Buck converter, full convertor and PWM inverter.
2. Able to simulate transmission line by incorporating line, load and transformer models.
3. Able to perform transient analysis of RLC circuit and single machine connected to infinite bus

4. Able to find load flow solution for a transmission network with Newton–Rampson method.

Note: Minimum 12 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations. In case if the student fails to get eligibility for semester end exams in the current semester, he/she has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted.

IV Year- VII Semester **COURSE CODE: UR19PROJEE711** **L T P C**
0 0 0 2

ITERNSHIP

Internal Marks: 100
External Marks: 0

The candidate shall submit the comprehensive report to the department. The report will be evaluated for 100 marks by the Review Committee consisting of Head of the department, Program Coordinator and Industry Institute Interaction Coordinator.

IV Year- VII Semester **COURSE CODE: UR19PROJEE712** **L T P C**
0 0 3 1.5

PROJECT STAGE-I

Internal Marks: 20
External Marks: 30

Syllabus Contents:
The project topic should be selected / chosen to ensure the satisfaction of the urgent need to establish a direct link between education, national development and productivity and thus reduce the gap between the world of work and the world of study. The project should have the following
1. Relevance to social needs of society
2. Relevance to value addition to existing facilities in the institute
3. Relevance to industry need
4. Problems of national importance
5. Research and development in various domain

The student should complete the following in project Stage I:
1. Literature survey Problem Definition
2. Motivation for study and Objectives
3. Preliminary design / feasibility / modular approaches
4. Implementation and Verification
5. Report and presentation

Guidelines for Project Stage – I:
1. As per the AICTE directives, the project is a yearlong activity, to be carried out and evaluated in two stages i.e. Stage – I: VII Semester and Stage – II: VIII Semester.
2. The project may be carried out preferably in-house i.e. department's laboratories and centers OR in industry allotted through department's T & P coordinator.
3. After multiple interactions with guide and based on comprehensive literature survey, the student shall identify the domain and define project objectives. The referred literature should preferably include IEEE/IET/IETE/Springer/Science Direct/ACM journals in the areas of power electronics (Hardware and Software), Circuits-Devices and Systems, power system and Security, Robotics and Control Systems, Signal Processing and Analysis and any other related domain. In case of Industry sponsored projects, the relevant application notes, while papers, product catalogues should be referred and reported.
4. Student is expected to detail out specifications, methodology, resources required, critical issues involved in design and implementation and stage wise work distribution, and submit the proposal within a month from the date of registration.

5. Stage– I deliverables: A document report comprising of summary of literature survey, detailed objectives, project specifications, paper and/or computer aided design, proof of concept/functionality, part results, a record of continuous progress.

6. Stage – I evaluation: A committee comprising of guides of respective specialization shall assess the progress/performance of the student based on report, presentation and Q &A. In case of unsatisfactory performance, committee may recommend repeating the Stage-I work.

Course Outcomes:

Student will be able to

1. Synthesize knowledge and skills previously gained.
2. Apply an in-depth study and execution of new technical problem.
3. Select from different methodologies, methods.
4. Form analysis to produce a suitable research design, and justify their design.
5. Present the findings of their technical solution in a written report.
6. Present the work in International/ National conference or reputed journals.

IV Year- VIII Semester **COURSE CODE: UR19PCEE801** **L T P C**
3 0 0 3

POWER SYSTEM OPERATION AND CONTROL

Internal Marks: 30
External Marks: 70

Course Objectives:

1. To understand optimal dispatch of generation with and without losses.
2. To study the optimal scheduling of hydro thermal systems.
3. To study the optimal unit commitment problem.
4. To study the load frequency control for single area system with and without controllers
5. To study the load frequency control for two area system with and without controllers

UNIT–I:
Economic Operation of Power Systems
Optimal operation of Generators in Thermal power stations, – Heat rate curve – Cost Curve – Incremental fuel and Production costs – Input–output characteristics – Optimum generation allocation with line losses neglected – Optimum generation allocation including the effect of transmission line losses – Loss Coefficients – General transmission line loss formula.

UNIT–II:
Hydrothermal Scheduling
Optimal scheduling of Hydrothermal System**:** Hydroelectric power plant models – Scheduling problems – Short term hydrothermal scheduling problem.

UNIT–III:
Unit Commitment
Optimal unit commitment problem – Need for unit commitment – Constraints in unit commitment – Cost function formulation – Solution methods – Priority ordering – Dynamic programming.

UNIT–IV:
Reactive Power Control
Overview of Reactive Power control – Reactive Power compensation in transmission systems– Advantages and disadvantages of different types of compensating equipment for transmission systems – Load compensation

UNIT–V:
Load Frequency Control
Modeling of steam turbine – Generator – Mathematical modeling of speed governing system – Transfer function – Modeling of Hydro turbine –Necessity of keeping frequency constant –

Definitions of Control area – Single area control system – Block diagram representation of an isolated power system – Steady state analysis – Dynamic response – Uncontrolled case. Proportional plus Integral control of single area and its block diagram representation – Steady state response.

Text Books:

1. Electric Energy systems Theory – by O.I.Elgerd, Tata McGraw–hill Publishing Company Ltd., Second edition.
2. Modern Power System Analysis – by I.J.Nagrath&D.P.Kothari Tata McGraw Hill Publishing Company Ltd, 2nd edition.

Reference Books:

1. Power System Analysis and Design by J.Duncan Glover and M.S.Sarma, Thompson, 3rdEdition.
2. Power System Analysis by Grainger and Stevenson, Tata McGraw Hill.
3. Power System Analysis by HadiSaadat – TMH Edition.
4. Power System stability & control, Prabha Kundur,TMH

Course Outcomes:

Students will be able to

1. Compute optimal scheduling of Generators.
2. Understand hydrothermal scheduling.
3. Understand the unit commitment problem.
4. Understand importance of the frequency.
5. Understand importance of PID controllers in single area and two area systems.
6. Understand reactive power control and compensation for transmission line.

IV Year- VIII Semester **COURSE CODE: UR19PEEE801** **L T P C**
3 0 0 3

FLEXIBLE ALTERNATING CURRENT TRANSMISSION SYSTEMS
(Professional Elective-V)

Internal Marks: 30
External Marks: 70

Course Objectives:

1. To learn the basics of power flow control in transmission lines using FACTS controllers
2. To explain operation and control of voltage source converter.
3. To understand compensation methods to improve stability and reduce power oscillations of a power system.
4. To learn the method of shunt compensation using static VAR compensators.
5. To learn the methods of compensation using series compensators

Unit–I:
Introduction to FACTS
Power flow in an AC System – Loading capability limits – Dynamic stability considerations– Importance of controllable parameters – Basic types of FACTS controllers – Benefits from FACTS controllers – Requirements and characteristics of high power devices – Voltage and current rating – Losses and speed of switching.

Unit–II:
Voltage source and Current source converters
Concept of voltage source converter(VSC) – Single phase bridge converter – Square–wave voltage harmonics for a single phase bridge converter Comparison of current source converter with voltage source converter.

Unit–III:
Shunt Compensators–1
Objectives of shunt compensation – Mid–point voltage regulation for line segmentation –End of line voltage support to prevent voltage instability – Improvement of transient stability– Power oscillation damping.

Unit–IV:
Shunt Compensators–2
Thyristor Switched Capacitor(TSC)– Thyristor Switched Reactor (TSC–TCR). Static VAR compensator(SVC) and Static Compensator(STATCOM)**:**The regulation and slope transfer function and dynamic performance.

Unit V:

Series Compensators

Static series compensators**:** Concept of series capacitive compensation – Improvement of transient stability – Power oscillation damping – Functional requirements. GTO thyristor controlled Series Capacitor (GSC) – Thyristor Switched Series Capacitor (TSSC) and Thyristor Controlled Series Capacitor (TCSC).

Text Book:

1. "Understanding FACTS" N.G.Hingorani and L.Guygi, IEEE Press.Indian Edition is available:—Standard Publications, 2001.

Reference Books:

1. "Flexible ac transmission system (FACTS)" Edited by Yong Hue Song and Allan T Johns, Institution of Electrical Engineers, London.
2. Thyristor-based FACTS Controllers for Electrical Transmission Systems, by R.MohanMathur and Rajiv k.Varma, Wiley

Course Outcomes:

The student will able to

1. Understand power flow control in transmission lines using FACTS controllers.
2. Understand operation and control of voltage source converter.
3. Analyze compensation methods to improve stability and reduce power oscillations in the transmission lines.
4. Understand the method of shunt compensation using static VAR compensators.
5. Understand the methods of compensations using series compensators.
6. Understand operation of Unified Power Flow Controller.

IV Year- VIII Semester **COURSE CODE: UR19PEEE802** **L T P C**
3 0 0 3

POWER SYSTEM DEREGULATION
(Professional Elective-V)

Internal Marks: 30
External Marks: 70

Course Objectives

1. To study fundamentals of power system deregulation and restructuring.
2. To study available transfer capability.
3. To study congestion management
4. To study various electricity pricing.
5. To study operation of power system in deregulated environment.

UNIT–I
Over view of key issues in electric utilities : Introduction – Restructuring models – Independent system operator (ISO) – Power Exchange – Market operations – Market Power – Standard cost – Transmission Pricing – Congestion Pricing – Management of Inter zonal/Intra zonal Congestion.

UNIT–II
OASIS: Open Access Same–Time Information System: Structure of OASIS – Processing of Information – Transfer capability on OASIS – Definitions Transfer Capability Issues – ATC – TTC – TRM – CBM calculations – Methodologies to calculate ATC.

UNIT–III
Congestion Management: Introduction to congestion management – Methods to relieve congestion.

UNIT–IV
Electricity Pricing: Introduction – Electricity price volatility electricity price indexes – Challenges to electricity pricing – Construction of forward price curves – Short–time price forecasting.

UNIT–V
Power system operation in competitive environment: Introduction – Operational planning activities of ISO – The ISO in pool markets – The ISO in bilateral markets – Operational planning activities of a Genco.

Text Books:

1. Kankar Bhattacharya, Math H.J. Boller, Jaap E.Daalder, 'Operation of Restructured Power System' Klum,er Academic Publisher – 2001
2. Mohammad Shahidehpour, and Muwaffaq alomoush, – "Restructured electrical Power systems" Marcel Dekker, Inc. 2001

Reference books:

1. Loi Lei Lai; "Power system Restructuring and Deregulation", Jhon Wiley & Sons Ltd., England.
2. Electrical Power Distribution Case studies from Distribution reform, upgrades and Management (DRUM) Program, by USAID/India, TMH.

Course Outcomes:

Students will be able to

1. Understand importance of power system deregulation and restructuring.
2. Compute ATC.
3. Understand transmission congestion management.
4. Compute electricity pricing in deregulated environment.
5. Understand power system operation in deregulated environment.
6. Understand importance of ancillary services.

IV Year- VIII Semester **COURSE CODE: UR19PEEE803** **L T P C**
3 0 0 3

HIGH VOLTAGE ENGINEERING
(Professional Elective-V)

Internal Marks: 30
External Marks: 70

Course Objectives:

1. To understand electric field distribution and computation in different configuration of electrode systems.
2. To understand HV breakdown phenomena in gases, liquids and solids dielectrics.
3. To acquaint with the generating principle of operation and design of HVDC, AC and impulse voltages and currents.
4. To understand various techniques of AC, DC and Impulse measurement of high voltages and currents.
5. To understand the insulating characteristics of dielectric materials.
6. To understand the various testing techniques of HV equipments.

UNIT–I:
Introduction to High Voltage Technology
Electric Field Stresses – Uniform and non–uniform field configuration of electrodes – Estimation and control of electric Stress – Numerical methods for electric field computation.

UNIT–II:
Break down phenomenon in gaseous, liquid and solid insulation
Gases as insulating media – Collision process – Townsend's criteria of breakdown in gases – Paschen's law –Pure and commercial liquids – Breakdown in pure and commercial liquid – Intrinsic breakdown – Electromechanical breakdown – Thermal breakdown –Breakdown of solid dielectrics.

UNIT–III:
Generation of High voltages and High currents
Generation of high DC voltages – Generation of high alternating voltages – Generation of impulse voltages and currents – Tripping and control of impulse generators.

UNIT–IV:
Measurement of high voltages and High currents
Measurement of high AC, DC and Impulse voltages – Voltages and measurement of high currents – Direct, alternating and Impulse.

UNIT–V:
Non–destructive testing of material and electrical apparatus
Measurement of DC resistivity – Measurement of dielectric constant and loss factor – Partial discharge measurements.

High voltage testing of electrical apparatus

Testing of insulators and bushings – Testing of isolators and circuit breakers – Testing of cables – Testing of transformers – Testing of surge arresters – Radio interference measurements.

Text Books:

1. High Voltage Engineering: Fundamentals by E.Kuffel, W.S.Zaengl, J.Kuffel by Elsevier, 2nd Edition.
2. High Voltage Engineering and Technology by Ryan, IET Publishers.

Reference Books:

1. High Voltage Engineering by M.S.Naidu and V. Kamaraju – TMH Publications, 3rd Edition
2. High Voltage Engineering by C.L.Wadhwa, New Age Internationals (P) Limited, 1997.
3. High Voltage Insulation Engineering by RavindraArora, Wolfgang Mosch, New Age International (P) Limited,1995.

Course Outcomes:

Students will be able to

1. Acquainted with the performance of high voltages with regard to different configurations of electrode systems.
2. Understand theory of breakdown and withstand phenomena of all types of dielectric materials.
3. Understand the techniques of generation of AC, DC and Impulse voltages.
4. Understand measurement of high voltage and high current AC, DC and Impulse.
5. Understand measure dielectric property of material used for HV equipment.
6. Understand techniques of testing various equipment's used in HV engineering.

IV Year- VIII Semester **COURSE CODE: UR19PEEE804** **L T P C**
3 0 0 3

DATA ANALYTICS WITH PYTHON
(Professional Elective-V)

Internal Marks: 30
External Marks: 70

Course Objectives:

1. Analyze different types of data using Python.
2. Prepare data for analysis.
3. Perform simple statistical analysis.
4. Create meaningful data visualizations and predict future trends from data.

UNIT I: Python Fundamentals for Data Analysis
Python data structures, Control statements, Functions, Object Oriented programming concepts using classes, objects and methods, Exception handling, Implementation of user-defined Modules and Package, File handling in python.

UNIT II: Introduction to Data Understanding and Preprocessing
Knowledge domains of Data Analysis, Understanding structured and unstructured data, Data Analysis process, Dataset generation, Importing Dataset: Importing and Exporting Data, Basic Insights from Datasets, Cleaning and Preparing the Data: Identify and Handle Missing Values.

UNIT III: Data Processing and Visualization
Data Formatting, Exploratory Data Analysis, Filtering and hierarchical indexing using Pandas. Data Visualization: Basic Visualization Tools, Specialized Visualization Tools, Seaborn Creating and Plotting Maps.

UNIT IV: Mathematical and Scientific applications for Data Analysis
Numpy and Scipy Package, Understanding and creating N-dimensional arrays, Basic indexing and slicing, Boolean indexing, Fancy indexing, Universal functions, Data processing using arrays, File input and output with arrays.

UNIT V: Analysing Web Data
Data wrangling, Web scrapping, Combing and merging data sets, Reshaping and pivoting, Data transformation, String Manipulation, case study for web scrapping.

Text Books

1. David Ascher and Mark Lutz, Learning Python, Publisher O'Reilly Media.
2. Reema Thareja, "Python Programming using Problem Solving approach",Oxford University press
3. Wes Mckinney "Python for Data Analysis", First edition, Publisher O'Reilly Media.

Reference Books

1. Allen Downey ,Jeffrey Elkner ,Chris Meyers,: Learning with Python, Dreamtech Press
2. David Taieb ,"Data Analysis with Python: A Modern Approach " 1st Edition,

Course Outcomes:

Students will be able to:

1. Understand basics of python for performing data analysis
2. Understand the data, performing preprocessing data
3. Understand processing and data visualization to get insights from data.
4. Understand the usage of different python packages for mathematical, scientific applications
5. Understand application for web data analysis.
6. Develop the model for data analysis and evaluate the model performance.

IV Year- VIII Semester **COURSE CODE: UR19PEEE804** **L T P C**
3 0 0 3

POWER QUALITY
(Professional Elective-V)

Internal Marks: 30
External Marks: 70

Course Objectives:

1. To learn different types of power quality phenomena.
2.To identify sources for voltage sag, voltage swell, interruptions, transients, long duration over voltages and harmonics in a power system.
3. To describe power quality terms and study power quality standards.
4. To learn the principle of voltage regulation and power factor improvement methods.
5. To explain the relationship between distributed generation and power quality.
6.To understand the power quality monitoring concepts and the usage of measuring instruments.

Unit–I:Introduction

Overview of power quality – Concern about the power quality – General classes of power quality and voltage quality problems – Transients – Long duration voltage variations – Short duration voltage variations – Voltage unbalance – Waveform distortion – Voltage fluctuation – Power frequency variations.

Unit–II:Voltage imperfections in power systems

Power quality terms – Voltage sags – Voltage swells and interruptions – Sources of voltage sag, swell and interruptions – Nonlinear loads – IEEE and IEC standards. Source of transient over voltages – Principles of over voltage protection – Devices for over voltage .

Unit–III: Voltage Regulation and power factor improvement:

Principles of regulating the voltage – Device for voltage regulation – Utility voltage regulator application – Capacitor for voltage regulation – End–user capacitor application -Flicker – Power factor penalty – Static VAR compensations for power factor improvement.

Unit– IV: Harmonic distortion and solutions

Voltage distortion vs. Current distortion – Harmonics vs. Transients – Harmonic indices – Sources of harmonics – Effect of harmonic distortion – Impact of capacitors, transformers, motors and meters – Point of common coupling – Passive and active

Unit–V: Distributed Generation and Power Quality

DG technologies – Interface to the utility system – Power quality issues and operating conflicts – DG on low voltage distribution networks.

Monitoring and Instrumentation

Power quality monitoring and considerations – Historical perspective of PQ measuring instruments – PQ measurement equipment – Assessment of PQ measuring data – Application of intelligent systems – PQ monitoring standards.

Text books:

1. Electrical Power Systems Quality, Dugan R C, McGranaghan M F, Santoso S, and Beaty H W, Second Edition, McGraw–Hill, 2012, 3rd edition.
2.Electric power quality problems –M.H.J.Bollen IEEE series-Wiley India publications,2011.

Reference Books:

1. Power Quality Primer, Kennedy B W, First Edition, McGraw–Hill, 2000.
2. Understanding Power Quality Problems: Voltage Sags and Interruptions, Bollen M HJ, First Edition, IEEE Press; 2000.
3. Power System Harmonics, Arrillaga J and Watson N R, Second Edition, John Wiley & Sons, 2003.
4. Electric Power Quality control Techniques, W. E. Kazibwe and M. H. Sendaula, Van Nostrad Reinhold, New York.
5. Power Quality C.shankaran, CRC Press, 2001
6. Harmonics and Power Systems –Franciso C.DE LA Rosa–CRC Press (Taylor & Francis)

Course Outcomes:

Student will be able to

1. Understand Differentiate between different types of power quality problems.
2. Understand the sources of voltage sag, voltage swell, interruptions, transients, long duration over voltages and harmonics in a power system.
3. Analyze power quality terms and power quality standards.
4. Understand the principle of voltage regulation and power factor improvement methods.
5. Understand the relationship between distributed generation and power quality.
6. Understand the power quality monitoring concepts and the usage of measuring instruments.

IV Year- VIII Semester **COURSE CODE:** **L T P C**
3 0 0 3

OPEN ELECTIVE-III

Internal Marks: 30
External Marks: 70

The student can choose any one Open Elective-III (OE-III) subject offered by other branches. The list of OEs are available in course structure.

IV Year- VIII Semester **COURSE CODE: UR19OEEE801** **L T P C**
3 0 0 3

NON CONVENTIONAL ENERGY SOURCES
(Open Elective-III)

Internal Marks: 30
External Marks: 70

Course Objectives:

1. To study the solar radiation data, extraterrestrial radiation, radiation on earth's surface.
2. To study solar thermal collectors.
3. To study solar photo voltaic systems.
4. To study wind energy conversion systems, Betz coefficient, tip speed ratio.
5. To study basic principle and working of hydro, biomass and fuel cells

UNIT–I: **Fundamentals of Energy Systems:** Energy conservation principle – Energy scenario (world and India) – energy audit- Energy index-Cost Index-cost of energy-Various forms of renewable energy (Basic outline) - Solar radiation: Outside earth's atmosphere – Earth surface

UNIT–II: Solar Thermal Systems: Liquid flat plate collectors: Performance analysis– Introduction to solar air heaters – Concentrating collectors, solar pond and solar still – solar thermal plants.

UNIT–III: Solar Photovoltaic Systems: Solar photovoltaic cell, module, array – construction – Efficiency of solar cells – Cell I-V characteristics – Equivalent circuit of solar cell – Applications– Balance of system components - storage sizing – Maximum power point techniques: Perturb and observe (P&O) technique

UNIT–IV: Wind Energy: Sources of wind energy - Wind patterns – Types of turbines – Horizontal axis and vertical axis machines - wind power – Betz limit – Tip–speed ratio – Efficiency – Power output of wind turbine – Selection of generator(synchronous, induction) – Speed drives– wind farms.

UNIT–V: Hydro, Biomass and Fuel Cell

Basic working principle – Classification of hydro systems: Large, small, micro – measurement of head and flow – Energy equation – Types of turbines

Biomass Energy: Photosynthesis and origin of biomass-biomass resources- Fuel classification – Pyrolysis – Direct combustion of heat – Different digesters and sizing.

Fuel cell: Classification of fuel for fuel cells – Fuel cell voltage– Efficiency – V-I characteristics

TEXT BOOKS:

1. Solar Energy: Principles of Thermal Collection and Storage, S. P. Sukhatme and J. K. Nayak, TMH, New Delhi, 3rd Edition.
2. Renewable Energy Resources, John Twidell and Tony Weir, Taylor and Francis .

REFERENCE BOOKS:

1. Energy Science: Principles, Technologies and Impacts, John Andrews and Nick Jelly, Oxford University Press.
2. Renewable Energy- Edited by Godfrey Boyle-oxford university.press,3rd edition,2013.
3. Handbook of renewable technology Ahmed and Zobaa, Ramesh C Bansal, World scientific.
4. Renewable Energy Technologies / Ramesh & Kumar /Narosa.
5. Renewable energy technologies – A practical guide for beginners – Chetong Singh Solanki, PHI publications.

Course Outcomes:

Student will be able to

1. Analyze solar radiation data, extraterrestrial radiation, and radiation on earth's surface.
2. Design solar thermal collectors, solar thermal plants.
3. Design solar photo voltaic systems.
4. Develop maximum power point techniques in solar PV and wind energy systems.
5. Understand wind energy conversion systems, wind generators, power generation.
6. Understand basic principle and working of hydro, tidal, biomass, fuel cell and geothermal systems.

IV Year- VIII Semester **COURSE CODE: UR19OEEE802** **L T P C**
3 0 0 3

INDUSTRIAL ELECTRICAL OPERATION

(Open Elective-III)

Internal Marks: 30
External Marks: 70

Course Objectives:

1. To understand optimal dispatch of generation with and without losses.
2. To study the optimal scheduling of hydro thermal systems.
3. To study the optimal unit commitment problem.
4. To study the load frequency control for single area system
5. To study the PID controllers for single area system and two area system.
6. To understand the reactive power control and compensation of transmission lines.

UNIT-I

SYSTEM PLANNING
Basic Design Considerations -Plant Distribution Systems -Distribution Types -Plant Power Demand and Load Estimate - Voltage Considerations

POWER SYSTEM STUDIES
Useful Formulae-Load Flow Short Circuits - Protective Device Coordination -Arc-Flash Hazard Calculations -Harmonic Analysis Power System Stability - Other Common Studies and Calculations

UNIT-II
SYSTEM NEUTRAL GROUNDING
Ungrounded System -High-Resistance (HR) Grounded System -Low-Resistance (LR) Grounded System -Solidly Grounded Neutral System - Generator Neutral Grounding -Grounding of Mine Power System - Neutral Grounding Equipment -System Capacitance Data

POWER TRANSFORMERS AND REACTORS
General Oil-Filled (Immersed) Transformers - Nonflammable Liquid-Filled Transformers Dry-Type Transformers - Transformers for Nonlinear Loads - Generator Step-Up and Other Special Transformers - Installation of Oil-Filled Transformers and Reactors Reactors Inspection and Testing

UNIT-III
INSTRUMENT TRANSFORMERS
Current Transformers - Voltage Transformers - Grounding of Secondary - European Standards

SWITCHGEAR, CIRCUIT BREAKERS, AND MOTOR CONTROL CENTER
Low Voltage Medium Voltage - Load-Interrupter Switchgear - Power Fuse Medium- and High-Voltage Circuit Breaker - SF6 Gas-Insulated Switchgear (GIS) -Low- and Medium-Voltage Motor Control Centers

UNIT-IV

STATION BATTERY
System Types- DC Distribution Systems - Types of Battery -Battery Chargers
Application Criteria - Battery Sizing

APPLICATION AND PROTECTION OF MEDIUM-VOLTAGE MOTORS
Load Characteristics - Squirrel-Cage Induction Motors -Wound Rotor (Slip Ring) Induction Motors -Synchronous Motors -Electric Motors for Variable Frequency Drives -Voltage Drop and Acceleration Time - Motor Controllers and Starting Methods

UNIT-V
POWER AND CONTROL CABLES
Cable Selection Criteria - Cable Shielding -Additional Application Considerations -Cable Insulation - Testing -Control Cables

PROTECTION
Protection and Coordination Principles -Transformer Protection -Motor Protection
Generator Protection - Feeder Protection - Capacitor Protection -Reactor Protection
Bus Protection

Text Books:

1. Electric Energy systems Theory – by O.I.Elgerd, Tata McGraw–hill Publishing Company Ltd., Second edition.
2. Power System stability & control, Prabha Kundur,TMH
3. Modern Power System Analysis – by I.J.Nagrath & D.P.Kothari Tata Mc Graw – Hill Publishing Company Ltd, 2nd edition.

Reference Books:
1. Power System Analysis and Design by J.Duncan Glover and M.S.Sarma, THOMPSON, 3rd Edition.
2. Power System Analysis by Grainger and Stevenson, Tata McGraw Hill.
3. Power System Analysis by Hadi Saadat – TMH Edition.

Course Outcomes:

Students will be able to

1. Compute optimal scheduling of Generators.
2. Understand hydrothermal scheduling.
3. Understand the unit commitment problem.
4. Understand importance of the frequency.
5. Understand importance of PID controllers in single area and two area systems.
6. Understand reactive power control and line power compensation.

IV Year- VIII Semester **COURSE CODE: UR19OEEE803** **L T P C**
3 0 0 3

HYBRID ELECTRIC VEHICLES

(Open Elective-III)

Internal Marks: 30
External Marks: 70

Course Objectives:

1. To present a comprehensive overview of Electric and Hybrid Electric Vehicles.

Unit -I INTRODUCTION TO ELECTRIC VEHICLE

Introduction to Hybrid Electric Vehicles: History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies. Conventional Vehicles: Basics of vehicle performance, vehicle power source characterization, transmission characteristics, mathematical models to describe vehicle performance

Unit –II HYBRID ELECTRIC VEHICLES

Hybrid Electric Drive-trains: Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis. Electric Drive-trains: Basic concept of electric traction, introduction to various electric drive-train topologies, power flow control in electric drive-train topologies, fuel efficiency analysis.

UNIT –III ELECTRIC PROPULSION

Electric Propulsion unit: Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Induction Motor drives

UNIT –IV ENERGY STORAGE SYSTEM

Energy Storage: Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Battery based energy storage and its analysis, Fuel Cell based energy storage and its analysis, Hybridization of different energy storage devices.

UNIT-V DRIVE SYSTEM

Sizing the drive system: Matching the electric machine and the internal combustion engine (ICE), Sizing the propulsion motor, sizing the power electronics, selecting the energy storage technology,

TEXT BOOKS:

1. Modern Electric, Hybrid Electric and Fuel Cell Vehicles – Fundamentals, Theory and Design – Mehrdad Ehsani, Uimin Gao and Ali Emadi – Second Edition – CRC Press, 2010.
2. Electric Vehicle Technology Explained – James Larminie, John Lowry – John Wiley & Sons Ltd, – 2003.

REFERENCE BOOKS

1. Electric Vehicle Battery Systems – Sandeep Dhameja – Newnes – New Delhi – 2002.
2. Hybrid electric Vehicles Principles and applications With practical perspectives -Chris Mi, Dearborn – M. Abul Masrur, David Wenzhong Gao – A John Wiley & Sons, Ltd., – 2011.
3. Electric & Hybrid Vehicles – Design Fundamentals – Iqbal Hussain, Second Edition, CRC Press, 2011.

Course Outcomes:

The students will be able to

1. Choose a suitable drive scheme for developing an electric hybrid vehicle depending on resources
2. Design and develop basic schemes of electric vehicles and hybrid electric vehicles.
3. Choose proper energy storage systems for vehicle applications.
4. Identify various communication protocols and technologies used in vehicle networks.
5. Understands the concept of Electric Propulsion.
6. Understands driving system(operation) of electric vehicle

IV Year- VIII Semester **COURSE CODE: UR19PROJEE801**

L	T	P	C
0	0	18	9

PROJECT STAGE-II

Internal Marks: 60
External Marks: 90

Syllabus Contents:

The project topic should be selected / chosen to ensure the satisfaction of the urgent need to establish a direct link between education, national development and productivity and thus reduce the gap between the world of work and the world of study. The project should have the following

1. Relevance to social needs of society
2. Relevance to value addition to existing facilities in the institute
3. Relevance to industry need
4. Problems of national importance
5. Research and development in various domain

The student should complete the following: The project stage-II is based on a report prepared by the students on project topic allotted to them. It may be based on:

1. Experimental verification / Proof of concept.
2. Design, fabrication, testing of Communication System.
3. The viva-voce examination will be based on the above report and work.

Guidelines for Project Stage – II

1. As per the AICTE directives, the project is a yearlong activity, to be carried out and evaluated in two stages i.e. Stage – I: VII Semester and Stage – II: VIII Semester.
2. The project may be carried out preferably in-house i.e. department's laboratories and centers OR in industry allotted through department's T & P coordinator.
3. After multiple interactions with guide and based on comprehensive literature survey, the student shall identify the domain and define project objectives. The referred literature should preferably include IEEE/IET/IETE/Springer/Science Direct/ACM journals in the areas of Computing and Processing (Hardware and Software), Circuits-Devices and Systems, Communication-Networking and Security, Robotics and Control Systems, Signal Processing and Analysis and any other related domain. In case of Industry sponsored projects, the relevant application notes, while papers, product catalogues should be referred and reported.
4. Student is expected to detail out specifications, methodology, resources required, critical issues involved in design and implementation and stage wise work distribution, and submit the proposal within a month from the date of registration.
7. During Stage – II, student is expected to exert on design, development and testing of the proposed work as per the schedule. Accomplished results/contributions/innovations should be published in terms of research papers in reputed journals and reviewed focused conferences OR IP/Patents.
8. Stage – II deliverables: A project report as per the specified format, developed system in the form of hardware and/or software, a record of continuous progress.

9. Stage – II evaluation: Guide along with appointed external examiner shall assess the progress/performance of the student based on report, presentation and Q &A. In case of unsatisfactory performance, committee may recommend for extension or repeating the work.

Course Outcomes:

At the end of the course, the student will be able to

1. Synthesize knowledge and skills previously gained.
2. Apply an in-depth study and execution of new technical problem.
3. Select from different methodologies, methods.
4. Form analysis to produce a suitable research design, and justify their design.
5. Present the findings of their technical solution in a written report.
6. Present the work in International/ National conference or reputed journals.