# SCHOOL OF ENGINEERING AND TECHNOLOGY SRI PADMAVATHI MAHILA VISVAVISYALAYAM (SCHEME OF INSTRUCTION AND EVALUATION OF B.TECH (EEE) DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING I YEAR – I SEMESTER (2016-17)

				TH	EOR	Y						
S.No	Course Code	Course Title	Hours per Week		Hours per Week Credits		Evaluation Internal Test (30Marks)			Exter (70 M	rnal arks)	Total Marks
			L	Т	P		Duration (Hr	rs) Max.	Marks	Duration	Max.	
1	BST01	English	4	-	-	4	2		30	3	70	100
2	BST03	Engineering Mathematics – I	4	-	-	4	2	,	30	3	70	100
3	BST05	Engineering Physics	4	-	-	4	2		30	3	70	100
4	CST01	Problem Solving and Computer Programming	4	-	-	4	2		30	3	70	100
5	ECT01	Electronic Materials and Devices	4	-	-	4	2		30	3	70	100
	•			PRAC	CTICA	ALS	•					- <u>-</u>
			Hours per Week Credits		Hours non			Evalu	uation	1		-
S.No	Course	Course Title			Internal (40 Marks)			External		Total		
	Code			1			Continuous	Tes	;t	(60 Marks)		Marks
			L	Т	P		Max. Marks	Duration	Max.	Duration	Max.	
6	MEP01	Engineering Graphics	-	-	4	2	20	2	20	3	60	100
7	BSP01	English Language Lab	-	-	2	1	20	2	20	3	60	100
8	BSP03	Engineering Physics Lab	-	-	2	1	20	2	20	3	60	100
9	CSP01	Computer Programming Lab	-	-	2	1	20	2	20	3	60	100
		Total		20	10	25						900

# SCHOOL OF ENGINEERING AND TECHNOLOGY SRI PADMAVATHI MAHILA VISVAVISYALAYAM (SCHEME OF INSTRUCTION AND EVALUATION OF B.TECH (EEE) DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING I YEAR – II SEMESTER (2016-17)

				TH	EORY	ζ						
S.No	Course Code	Course Title	Hours per Week		Credits	Internal Test(30Ma		ks)	External (70 Marks)		Total Marks	
			L	T	Р		Duration	n (Hrs)	Max.	Duration	Max.	
1	BST02	Environmental Studies	4	-	-	4	2		30	3	70	100
2	BST06	Engineering Mathematics – II	4	-	-	4	2		30	3	70	100
3	BST04	Engineering Chemistry	4	-	-	4	2		30	3	70	100
4	CST02	Data Structures	4	-	-	4	2		30	3	70	100
5	MET19	Elements of Mechanical Engineering	4	-	-	4	2		30	3	70	100
6	EET01	Circuits and Networks-I	4	-	-	4	2		30	3	70	100
			I	PRAC	TICA	LS	•		•			
							Evaluation					
S No	Course	Course Title	Hours per Week Credits		Hours per Week		Internal (40 Marks)			External		Total Marks
5.INU	Code	Course The					Continuous	Test		(60 Ma	arks)	
			L	Т	Р		Max. Marks	Duration	Max.	Duration	Max.	
7	MEP02	Workshop	-	-	2	1	20	2	20	3	60	100
8	BSP02	Engineering Chemistry Lab	-	-	2	1	20	2	20	3	60	100
9	CSP02	Data Structures Lab	-	-	2	1	20	2	20	3	60	100
		Total		24	6	27			•			900

# SCHOOL OF ENGINEERING AND TECHNOLOGY SRI PADMAVATHI MAHILA VISVAVISYALAYAM (SCHEME OF INSTRUCTION AND EVALUATION OF B.TECH (EEE) DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING II YEAR – I SEMESTER (2016-17)

THEORY														
S.No	Course Code	Course Title	Hours per Week		Hours per Week		eek Credits		Internal Test (30Marks)			Extern (70 Mar	al ks)	Total Marks
			L	Т	Р		Duration	Max. Marl	ks Du	iration	Max.			
1	BST07	Engineering Mathematics-III	4	-	-	4	2	30		3	70	100		
2	BST09	Managerial Economics& Financial Analysis	4	-	-	4	2	30		3	70	100		
3	EET02	Circuits & Networks-II	4	-	-	4	2	30		3	70	100		
4	ECT03	Digital Electronics	4	-	-	4	2	30		3	70	100		
5	EET03	Electrical Machines-I	4	-	-	4	2	30		3	70	100		
6	ECT04	Electronic Circuits	4	-	-	4	2	30		3	70	100		
			F	PRAC	TICA	LS								
								Evalua	tion					
S No	Course	Course Title	H	ours p Week	ber	Credits	Interna	l (40 Marks)		Exte	rnal	Total		
<b>3.</b> 110	Code	Course The			-		Continuous	Test		(60 M	arks)	Marks		
			L	Т	Р		Max. Marks	Duration N	lax.	Duration	Max.			
7	ECP14	Electronic Devices & Circuits Lab	-	-	2	1	20	2	20	3	60	100		
8	EEP01	Circuits & Networks Lab	-	-	2	1	20	2	20	3	60	100		
		Total	24		4	26						800		

# SCHOOL OF ENGINEERING AND TECHNOLOGY SRI PADMAVATHI MAHILA VISVAVISYALAYAM (SCHEME OF INSTRUCTION AND EVALUATION OF B.TECH (EEE) DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING II YEAR – II SEMESTER (2016-2017)

				TH	EORY	ζ						
								Eva	aluation			
S.No	Course Code	Course Title	H	ours p Week	<b>ber</b>	Credits	Internal	al Test (30Marks)		External (70 Marks)		Total Marks
			L	Т	Р		Duration (Hrs)	Max. M	larks	Duration (Hrs)	Max. Marks	
1	ECT22	Signals & Systems with Random Process	4	-	-	4	2	30		3	70	100
2	ECT23	Pulse& Digital Circuits	4	-	-	4	2	30		3	70	100
3	EET04	Electro Magnetic Theory	4	-	-	4	2	30		3	70	100
4	EET05	Electrical Machines-II	4	-	-	4	2	30		3	70	100
5	MET10	Fluid Mechanics and Hydraulic Machinery	4	-	-	4	2	30		3	70	100
6	EET06	Power Systems-I	4	-	-	4	2	30		3	70	100
			]	PRAC	TICA	LS					•	•
							Evaluation					
S No	Course	Course Title	H	ours p Week	oer	Credits	Interna	al (40 Mar	ks)	Exte	rnal	Total
9.INU	Code	Course fille			-		Continuous	Те	est	(60 M	arks)	Marks
			L	Т	Р		Max. Marks	Duration	Max.	Duration	Max.	
7	ECP15	Pulse& Digital Circuits Lab	-	-	2	1	20	2	20	3	60	100
8	MEP05	Fluid Mechanics and Hydraulic Machinery Lab	-	-	2	1	20	2	20	3	60	100
		Total	24		4	26						800

# SCHOOL OF ENGINEERING AND TECHNOLOGY SRI PADMAVATHI MAHILA VISVAVISYALAYAM (SCHEME OF INSTRUCTION AND EVALUATION OF B.TECH (EEE) DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING III YEAR – ISEMESTER (2016-2017)

				TH	EORY	ζ.							
								Eva	aluation				
S.No	Course Code	Course Title	Week		<sup>k</sup> Credits		Internal	Test (30M	Exter (70 Ma	rnal arks)	Total Marks		
			L	Т	Р		Duration	(Hrs)	Max.	Duration	Max.		
1	MET32	Power Plant Engineering	4	-	-	4	2		30	3	70	100	
2	EET07	Control Systems	4	-	-	4	2		30	3	70	100	
3	EET08	Electrical Measurements	4	-	-	4	2		30	3	70	100	
4	ECT25	Analog& Digital IC Applications	4	-	-	4	2		30	3	70	100	
5	EET09	Electrical Machines-III	4	-	-	4	2		30	3	70	100	
6	EET10	Power Systems-II	4		4	2		30	3	70	100		
PRAC	TICALS									-			
								Eva	aluation				
	Course		Hou	irs pe	r	Credite	Internal (40 Marks)			External			
S.No	Code	Course Title	Wee	ж		circuits	Continuous Evaluation	Test		(60 M	arks)	Marks	
			L	Т	Р		Max. Marks	Duration	Max.	Duration	Max.		
7	EEP02	Electrical Machines-I Lab	-	-	2	1	20	2	20	3	60	100	
8	ECP16	Analog& Digital IC Applications Lab	-	-	2	1	20	2	20	3	60	100	
	1	Total	24		4	26		•	1		L	800	

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THEORY												
								Eva	luation			
S.No	S.No Course Course Title			ours p Week	ber K	Credits	Internal '	Internal Test (30Marks)			nal arks)	Total Marks
			L	L T P			Duration (Hr	s) Max.	Marks	Duration	Max.	
1	BST10	Management Science	4	-	-	4	2		30	3	70	100
2	EET11	Switchgear & Protection	4	-	-	4	2		30	3	70	100
3	ECT09	Microprocessor &Interfacing	4	-	-	4	2		30	3	70	100
4	EET12	Power Electronics	4	-	-	4	2		30	3	70	100
5		ELECTIVE-I	4	-	-	3	2		30	3	70	100
6		ELECTIVE-II	4	-	-	3	2		30	3	70	100
		·				·						
C No	Course		H	ours p Week	ber	Credits	Interna	l (40 Mar	ks)	Exter	mal	Total Marks
<b>5.</b> 1NO	Code	Course little		VV CCI	•		Continuous	Te	st	(60 Ma	arks)	iviui iso
			L	Т	Р		Max. Marks	Duration	Max.	Duration	Max.	
8	EEP03	Electrical Measurements Lab	-	-	2	1	20	2	20	3	60	100
9	EEP04	Electrical Machines-II Lab	-	-	2	1	20	2	20	3	60	100
		Total	24		4	24						800

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THEORY																
							Eva	aluation								
S.No	Course Code	Course Title	Hours per Week		Hours per Week		Hours per Week Cr		Hours per       Week     Credits		Internal Test (30Marks)			External (70 Marks)		Total Marks
			L	Т	Р		Duration (H	rs) Max	. Marks	Duration	Max.					
1	ECT27	Analog& Digital Communications	4	-	-	4	2		30	3	70	100				
2	EET13	Power System Analysis	4	-	-	4	2		30	3	70	100				
3	EET14	Power System Operation& Control	4	-	-	4	2		30	3	70	100				
4	EET15	Power Semiconductor Drives	4	-	-	4	2		30	3	70	100				
5		Elective-III	4	-	-	3	2		30	3	70	100				
6		Elective-IV	4	-	-	3	2		30	3	70	100				
			I	PRAC	TICA	LS				· · · · · · · · · · · · · · · · · · ·						
								Eva	luation							
C No	Course		H	ours p Week	ber	Credits	Interna	l (40 Mar	ks)	Exter	nal	Total				
<b>3.</b> 1N0	Code	Course The		,, cen			Continuous	Te	est	(60 Ma	arks)	Marks				
			L	Т	Р		Max. Marks	Duration	Max.	Duration	Max.					
7	EEP05	Power Electronics Lab	-	-	2	1	20	2	20	3	60	100				
8	EEP06	Power System Simulation Lab	-	-	2	1	20	2	20	3	60	100				
		Total	24		4	24						800				

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				TH	EORY	<i>l</i>						
								Eva	aluation			
S.No	Course Code	Course Title		ours p Week	ber	Credits	Interna	l Test (301	Marks)	Exter (70 Ma	rnal arks)	Total Marks
			L	Т	Р		Duration (H	rs) Max	x. Marks	Duration (Hrs)	Max. Marks	
1	EET16	Utilization of Electrical Energy	4	-	-	4	2		30	3	70	100
2		Elective-V	4	-	-	3	2		30	3	70	100
3		Elective-VI	4	-	-	3	2		30	3	70	100
			Ī	PRAC	TICA	LS		·				
								Eva	luation			
			H	ours p	oer	Credits	Internal (40 Marks)			_ Extornal		Total
S.No	Course Code	Course Title		Week			Continuous EvaluationTest		est	(60 Marks)		Marks
			L	Т	Р		Max. Marks	Duration (Hrs)	Max. Marks	Duration (Hrs)	Max. Marks	
4	EEP13	Project Work	-	-	3	6	20	2	20	3	60	100
		Total	12		3	16						400

# SCHOOL OF ENGINEERING AND TECHNOLOGY SRI PADMAVATHI MAHILA VISVAVISYALAYAM DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

# LIST OF ELECTIVES (2016-2017)

# ELECTIVE – I

ELECTIVE – I	[
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S.No	Course Code	Course Title
1	EET19	Renewable Energy Sources
2	ECT44	Electronic Instrumentation
3	EET20	Modern Control Theory
4	EET21	Energy Audit and Demand Side Management
5	CSP13	Advanced Programming Lab

**ELECTIVE - III** 

S.No	Course Code	Course Title
1	EET23	Neural Network & Fuzzy Logic
2	EET24	Switch Mode Power Converters
3	ECT34	Satellite Communication
4	EET25	Smart Electrical Grids

S.No	Course Code	Course Title
1	ECT15	VLSI Design
2	ECT10	Digital Signal Processing
3	CST48	Fundamentals of Database Management Systems
4	EET22	Power Quality
5	MUP01	Music(OPEN ELECTIVE)
6	MUP02	Dance-Bharatanatyam(OPEN ELECTIVE)
7	MUP03	Dance-Kuchipudi(OPEN ELECTIVE)

# SCHOOL OF ENGINEERING AND TECHNOLOGY SRI PADMAVATHI MAHILA VISVAVISYALAYA DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

# LIST OF OPEN ELECTIVES (2019-20)

# ELECTIVE-IV

**ELECTIVE – V** 

S.No	Course Code	Course Title
1	EET26	High Voltage Engineering
2	CST47	Computer Networking
3	ECT36	Digital Image Processing
4	EET27	Electrical Machine Design
	MOOCS	

S.N	0	Course Code	Course Title
1		EET28	High Voltage Direct Current Transmission
2		EET29	Digital Control Systems
3		ECT45	Microcontrollers & Its Applications
4		EET30	Special Machines

# ELECTIVE – VI

S.No	Course Code	Course Title
1	EET31	Electrical Distribution Systems
2	ECT19	Embedded Systems
3	EET32	Flexible AC Transmission Systems
4	CST44	Computer Organization& Architecture

**SYLLABUS** 

B.Tech I Year I Semester

# B.Tech I Year I Semester

S.No	Course Code	Course Title
1	BST01	English
2	BST03	Engineering Mathematics – I
3	BST05	Engineering Physics
4	CST01	Problem Solving and Computer Programming
5	ECT01	Electronic Materials and Devices
6	MEP01	Engineering Graphics
7	BSP01	English Language Lab
8	BSP03	Engineering Physics Lab
9	CSP01	Computer Programming Lab

#### **BST01 ENGLISH**

Credits – 4 L: T: P::4: 0:0

### UNIT – I

**Inspiration:** Reaching for the Stars. Comprehension, Vocabulary, Grammar, Listening, Speaking, Reading and Writing.

**Information Technology:** A Very Short History of Computer Ethics. Comprehension, Vocabulary, Grammar, Listening, Speaking, Reading and Writing.

### $\mathbf{UNIT} - \mathbf{II}$

Writing English: Letter Writing, Résumé writing, Electronic Mode of Writing, Information Transfer, Note Taking & Reading Comprehensive.

#### **UNIT-III**

**Travel and Transport:** The Climb to Annapurna. Comprehension, Vocabulary, Grammar, Listening, Speaking, Reading and Writing.

**Media:** Freedom of Press, Comprehension, Vocabulary, Grammar, Listening, Speaking, Reading and Writing.

### $\mathbf{UNIT} - \mathbf{IV}$

**Human Interest**: A Service of Love. Comprehension, Vocabulary, Grammar, Listening, Speaking, Reading and Writing.

**Environment**: Water. Comprehension, Vocabulary, Grammar, Listening, Speaking, Reading and Writing.

### UNIT - V

Grammar: Tenses: Past and Present, Fundamentals of Grammar, Correction of Sentences.

# **TEXT BOOKS:**

Learning English: A communicative Approach – Orient Longman A Manual for English Language Laboratories – D.Sudha Rani - Pearson

### **REFERENCES:**

- 1. Hancock, Mark, English Pronunciation in Use CUP
- 2. Murphy, Raymond, Essential English Grammar CUP
- 3. English vocabulary in use CUP
- 4. M. Gnanamurali. English Grammar at a Glance S.Chand& Company Ltd.
- 5. LeenaSen, Communication Skills Prentice Hall of India

## **BST03 - ENGINEERING MATHEMATICS – I**

Credits – 4 L: T: P::4: 0:0

## UNIT – I

**Calculus**: Roll's and Mean value theorems, Taylor's theorem, Maclaurins theorem - Maxima & minima for functions of two variables – Curve tracing.

### UNIT - II

**Multiple integrals:** Double and triple integrals, Change of order of integration, Change of variables – Simple applications – areas & volumes.

## UNIT – III

**Differential Equations-I:** Exact, Linear and Bernoulli's equations, orthogonal trajectories; Homogeneous and Non-Homogeneous linear differential equations of second and higher order with constant coefficients.

## UNIT – IV

**Differential Equations-II**: Linear equations with variable coefficients - Euler equations, Method of variation of parameters, Simultaneous equations.

## $\mathbf{UNIT}-\mathbf{V}$

**Vector Calculus:** Gradient, Divergence, Curl and related properties; Line, surface and volume integrals; Stokes, Greens and Gauss-Divergence theorems.

## Text books:

- 1. Higher Engineering Mathematics, 42nd Edition, Grewal, B.S., Khanna Publications, New Delhi.
- 2. Engineering Mathematics, Vol-I, II, Dr. M.K. Venkata Raman, National Publishing Co., Madras.
- 3. Advanced Engineering Mathematics, 9<sup>th</sup> Edition, Erwin Kresyzing, Wiley Eastern Ltd., New Delhi.
- 4. Engineering Mathematics, 6th Edition, B.V. Ramana, Tata McGraw Hill, New Delhi

### **BST05 ENGINEERING PHYSICS**

## UNIT I:

**Principles of Quantum Mechanics:** Waves and Particles, de Broglie Hypothesis, Matter Waves, Davisson and Germer's Experiment, Heisenberg's Uncertainty Principle

Schrödinger's Time depended and Independent Wave Equation - Physical Significance of the Wave Function – Particle in a one dimensional infinite potential well

#### **UNIT-II:**

**Band Theory of Solids:** Classical free electron theory of metals-Success and Failures-Quantum free electron theory-Fermi Factor-Electron in periodic potential-Bloch Theorem- Kronig-Penny Model

Distinction between metals, Insulators and semiconductors-Intrinsic and Extrinsic semiconductors-Hall effect

#### UNIT – III:

**Semiconductors :** Introduction, intrinsic and extrinsic semiconductors, direct and indirect band gap semiconductors, carrier concentration, electrical conductivity in semiconductors, drift and diffusion, Hall effect, p-n junction diode, diode equation, LED, LCD and photo diode

**Superconductivity:** General properties, Meissner effect, penetration depth, Type-I and Type-II superconductors, flux quantization, Josephson effects, BCS theory, applications of superconductors.

## **UNIT IV:**

Lasers & Fiber Optics: Characteristics of Lasers, Spontaneous and Stimulated Emission of Radiation, Einstein's Coefficients and Relation between them, Population Inversion, Lasing Action, Ruby Laser, Helium-Neon Laser, Semiconductor Diode Laser, Applications of Lasers

Principle of Optical Fiber, Construction of fiber, Acceptance Angle and Acceptance Cone, Numerical Aperture, Types of Optical Fibers: Step Index and Graded Index Fibers, Attenuation in Optical Fibers, Application of Optical Fiber in communication systems.

### UNIT V:

**Nano Materials:** Introduction-properties: optical properties-quantum confinement-electrical propertiessynthesis of nano materials: Ball milling, arc deposition, chemical vapour deposition, pulsed laser deposition methods

characteristics of C (zero dimensional),Carbon nanotubes (1 dimensional), Graphene (2 dimensional).Applications of nanomaterials.

# **Text Books:**

- 1. Engineering Physics V. Rajendran, K.Thyagarajan Tata MacGraw Hill Publishers, III Edition, 2012.
- 2. Engineering physics M.N. Avadhanulu and P.G. KshirSagar, S.Chand and Co, Revised Edition, 2013.
- 3. Engineering Physics M. Arumugam, Anuradha Publications II Edition, 1997
- **4.** Engineering Physics Hitendra K Mallik and AK Singh, McGraw Hill Education Pvt. Ltd, New Delhi , I Edition, 2010

# **Reference Books:**

- 1. Modern Physics- R.Murugeshan, Er.Kiruthiga Sivaprasath, S.Chand and Co, Revised Edition, 2013.
- 2. A Text book of Quantum Mechanics- Sathya prakash
- 3. Introduction to solid state physics, Kittel, Wiley Eastern Ltd., 2003
- 4. Principles of Electronics-V.K.Mehta, S.Chand and Co, Revised Edition 2008.
- 5. Fiber Optics & Laser The Two Revolutions-Ajoy Ghatac&K.Thiyagarajan,Macmillan Publishers India Ltd,2006.
- 6. Text book of Nanoscience and Nanotechnology: B S Murthy, P.Shankar, Baldev Raj B B Rath, James Murday, University Press, I Edition, 2012.

## CST01 PROBLEM SOLVING AND COMPUTER PROGRAMMING

Credits – 4 L: T: P::4: 0:0

## UNIT I

Introduction to Problem Solving: Introduction to Computer Systems, Computer Environments, Computer Languages, Problem Solving Aspects, Top-Down Design, Development of Algorithms, Representation of Algorithm, Flow Chart, Pseudo Code, Coding, Testing and Debugging.

### UNIT II

History of C programming Language, form of a C program - Comments, pre-processor statements, function header statements, variable declaration statements and executable statements.

C character set, C tokens- constants, identifiers, operators, punctuations and keywords. Basic data types, modifiers, identifiers, variables, C Scopes, Type qualifiers, Storage Class Specifiers, variable initializations and constants, I/O statements, operators, expressions, operator precedence and associativity.

Category of Statements - Selection, Iteration, Jump, Label, Expression and Block.

## UNIT III

Functions - Declaration, Prototype definition, calling by value and address, Standard Library Functions, Recursive Functions.

Arrays and strings - Declaration, Initialization, Reading and Writing, Accessing, and Passing as a parameter to functions, Multidimensional arrays, String functions.

### UNIT IV

Pointers - pointer expressions, pointer and arrays, multiple indirection, initializing pointers, pointers to functions, Dynamic memory allocation functions.

Structures - declaration, initialization, accessing, array of structures and passing structures to functions, structure pointers, arrays and structures within structures, Unions, Bit-fields, typedef, and enumerations.

## UNIT V

Files - I/O and processing operations on Text and binary files, Pre-processor directives and Command Line Arguments.

### **Text Books:**

- 1. Schildt H, C: The Complete Reference, 4th Edition, Tata McGraw-Hill, 2002.
- 2. Balagurusamy E, Programming in ANSI C, 4th Edition, Tata McGraw-Hill, 2008
- 3. R.G.Dromey, How to Solve it by Computer, PHI.

#### **Reference Books:**

- 1. Let us C, Yeswanth Kanitkar, Ninth Edition, BPB Publications.
- 2. Programming In C, Second Edition- Pradip Dey, Manas Ghosh, Oxford University Press.

## ECT01 ELECTRONIC MATERIALS AND DEVICES

Credits – 4 L: T: P::4: 0:0 Sessional Marks: 30 University Exam Marks: 70

### UNIT – I

**ELECTRON DYNAMICS AND CRO:** Motion of charged particles in electric and magnetic fields. Simple problems involving Electric and Magnetic fields only. Principles of CRT. Deflection sensitivity Electrostatic and magnetic deflection systems. Applications of CRO.

# UNIT - II

**SEMICONDUCTORS AND PN JUNCTION DIODE:** Conductors, Semiconductors and Insulators. Conductivity and mobility. Intrinsic and extrinsic semiconductors. Fermi level and carrier concentration of p and n type semiconductors. Drift and diffusion currents. Hall effect.

PN Junction diode. Volt-ampere characteristic and its temperature dependence – Diode resistance and capacitance, zener diode, varactor diode, Half-wave and full-wave rectifiers.

## UNIT – III

**BIPOLAR JUNCTION TRANSISTOR:** Transistor action, NPN and PNP transistors CB, CE, CC configurations and their characteristics and parameters. Transistor as an amplifier. CB, CE and CC amplifiers and their comparison.

## UNIT - IV

**FIELD EFFECT TRANSISTOR:** Characteristics and parameters of JFET, depletion and enhancement type MOSFETS. FET amplifier CS, CD, and CG amplifiers and their comparison.

Comparison of BJT and FET amplifiers, Characteristics and parameters of UJT and SCR.

## UNIT V

**OPTO ELECTRONIC DEVICES:** Principles of operation and characteristics of Photo conductors, Photo diodes and transistors, Photovoltaic cells, Display devices LED and LCD. Seven segment display, Spontaneous emission, stimulated emission, population inversion, optical resonant cavity, Semiconductor Lasers.

## **TEXT BOOKS:**

- 1. Millman and Halkias, "Electronic Devices and Circuits". Tata Mc Graw Hill & Co.
- 2. R.L. Boylestad and Louis Nashelsky, " Electronic Devices and Circuit Theory", Pearson Education.
- 3. Floyd, "Electronic Devices". Pearson Education.

### **MEP 01 ENGINEERING GRAPHICS**

# UNIT I

**Introduction to Engineering Drawing**: Principles of Engineering Graphics and their Significance- Conventions in Drawing-Lettering – BIS Conventions.

Scales: Plain scales and Diagonal scales

Conics: Construction of ellipse, parabola and hyperbola using eccentricity method

Ellipse: Concentric circles method, Oblong method, arcs of circles method

Parabola: - Rectangular method, parallelogram method, Rectangular hyperbola

#### **UNIT II**

Special curves: - Cycloids, Epicycloids and Hypocycloids

Involutes:- Involutes of a circle and polygons

**Projection of Points**: Principles of orthographic projection – Convention – First angle projections, projections of points.

### **UNIT III**

**Projections of Straight Lines:** Projections of lines inclined to single plane Projections of lines inclined to both planes - True lengths and true inclinations.

**Projections of Planes**: Projections of regular plane surfaces (polygons, circular lamina) - plane surfaces inclined to one plane- plane surfaces inclined to both planes.

#### UNIT IV

**Projections of Solids**: Projections of Right Regular Solids (prisms, pyramids, cone, and cylinder) axis inclined to one plane

**Sections of Solids**: Sections of simple Solids in simple vertical position Cutting plane inclined to one plane and perpendicular to the other plane.

**Developments of Surfaces:** Development of Surfaces of Right Regular solids like prism, Cylinder, Pyramid, Cone.

### UNIT V

**Isometric and Orthographic Projections**: Principles of isometric projection-Isometric Scale- Isometric Views- Conventions- Isometric Views of lines, Planes, Simple solids (cube, cylinder and cone).

Conversion of isometric Views to Orthographic Views of simple objects

# **Text Books:**

- 1. Engineering Drawing, N.D. Bhat, Charotar Publishers
- 2. Engineering Drawing, K.L. Narayana& P. Kannaih, Scitech Publishers, Chennai.

### **References:**

1. Engineering Drawing, Johle, Tata McGraw-Hill Publishers,2014 Engineering Drawing, N.S Patha sarathy, vela murali, Oxford University Press,2015 2.

- 3. Engineering Graphics D.A.Hindoliya, BSP publications, 2014
- 4. Engineering Graphics, K.C.John, PHI,2014

# **BSP01 COMMUNICATIVE ENGLISH LABS**

# Credits: 1

# Internal Marks: 40 University Examination Marks: 60

# **UNIT-I SPEAKING**

- i) Speech Sounds: Vowels and Consonants
- ii) Accent & Rhythm: Word and Sentence Accent
- iii) Intonation: rising tone, falling tone.

Number of Hours: 8

# UNIT – II WRITING

i) Spelling and Punctuation

ii) Dialogue Writing and Paragraph writing

Number of Hours: 6

# **UNIT- III ORAL PRESENTATIONS**

- i) Panel Discussions (Group Discussion)
- ii) Just a minute (JAM), Debate, Role Play

Number of Hours: 12

# UNIT – IV VOCABULARY

Missing words, Phrasal verbs and Idiomatic expressions, Proverbs

# **BSP03 ENGINEERING PHYSICS LAB**

# Credits: 1

Internal Marks: 40 University Examinations Marks: 60

# LIST OF EXPERIMENTS (Minimum Six are mandatory)

- 1. Determination of Numerical aperture of an optical fiber
- 2. Youngs modulus non uniform bending optic lever
- 3. Calibration of voltmeter / ammeter using potentiometer
- 4. Spectrometer-Determination of angle of prism.
- 5. Laser-Determination of wavelength using grating.
- 6. Bending losses of fibres & Evaluation of numerical aperture of a given fibre
- 7. Regidity Modulus-Torsional pendulum
- 8. Post office box Determination of Band gap of a semiconductor

# CSP01 PROBLEM SOLVING AND COMPUTER PROGRAMMING LAB

## Credits: 1

# Internal Marks: 40 University Examinations Marks: 60

## List of Experiments:

- 1. Write, Edit, Debug, Compile and Execute Sample C programs to understand the programming environment.
- 2. Practice programs: Finding the sum of three numbers, exchange of two numbers, maximum of two numbers, To read and print variable values of all data types of C language, to find the size of all data types, to understand the priority and associativity of operators using expressions, to use different library functions of C language.
- 3. Write a program to find the roots of a Quadratic equation.
- 4. Write a program to compute the factorial of a given number.
- 5. Write a program to check whether the number is prime or not.
- 6. Write a program to find the series of prime numbers in the given range.
- 7. Write a program to generate Fibonacci numbers in the given range.
- 8. Write a program to find the maximum of a set of numbers.
- 9. Write a program to reverse the digits of a number.
- 10. Write a program to find the sum of the digits of a number.
- 11. Write a program to find the sum of positive and negative numbers in a given set of numbers.
- 12. Write a program to check for number palindrome.
- 13. Write a program to evaluate the sum of the following series up to 'n' terms

 $e^{x} = 1 + x + \frac{x^{2}}{2! + x^{3}} + \frac{x^{4}}{4! + \cdots + x^{4}}$ 

- 14. Write a program to generate Pascal Triangle.
- 15. Write a program to read two matrices and print their sum and product in the matrix form.
- 16. Write a program to read matrix and perform the following operations.

i. Find the sum of Diagonal Elements of a matrix.

ii. Print Transpose of a matrix.

- iii. Print sum of even and odd numbers in a given matrix.
- 17. Write a program to accept a line of characters and print the number of Vowels, Consonants, blank spaces, digits and special characters.
- 18. Write a program to insert a substring in to a given string and delete few characters from the string. Don't use library functions related to strings.
- 19. Write a program to perform the operations addition, subtraction, multiplication of complex numbers.
- 20. Write a program to split a 'file' in to two files, say file1 and file2. Read lines into the 'file' from standard input. File1 should consist of odd numbered lines and file2 should consist of even numbered lines.
- 21. Write a program to merge two files.
- 22. Write a program to implement numerical methods Lagrange's interpolation, Trapezoidal rule.
- 23. Write a program to read a set of strings and sort them in alphabetical order.
- 24. Write a program to exchange two numbers using pointers.
- 25. Write a program to read student records into a file. Record consists of roll no, name and marks of a student in six subjects and class. Class field is empty initially. Compute the class of a student. The calculation of the class is as per JNTUA rules. Write the first class, second class, third class and failed students lists separately to another file.

- 26. A file consists of information about employee salary with fields employee id, name, Basic, HRA, DA, IT, other deductions, Gross and Net salary. Initially only employee id, name, and basic have valid values. HRA is taken as 10% of the basic, DA is taken as 80% of basic, IT is 20% of the basic, other deductions is user specified. Compute the Gross and Net salary of the employee and update the file.
- 27. Write a program to perform Base (decimal, octal, hexadecimal, etc) conversion.
- 28. Write a program to find the square root of a number without using built-in library function.
- 29. Write a program to convert from string to number.
- 30. Write a program to implement pseudo random generator.
- 31. Write a program to generate multiplication tables from 11 to 20.
- 32. Write a program to express a four digit number in words. For example 1546 should be written as one thousand five hundred and forty six.
- 33. Write a program to generate a telephone bill. The contents of it and the rate calculation etc should be as per BSNL rules. Student is expected to gather the required information through the BSNL website.
- 34. Write a program to find the execution time of a program.
- 35. Design a file format to store a person's name, address, and other information. Write a program to read this file and produce a set of mailing labels.

B.Tech I Year II Semester

# B.Tech I Year II Semester

S.No	Course Code	Course Title
1	BST02	Environmental Studies
2	BST06	Engineering Mathematics – II
3	BST04	Engineering Chemistry
4	CST02	Data Structures
5	MET19	Elements of Mechanical Engineering
6	EET01	Circuits and Networks-I
7	MEP01	Workshop
8	BSP02	Engineering Chemistry Lab
9	CSP02	Data Structures Lab

### **BST02 ENVIRONMENTAL STUDIES**

(COMMON TO CSE AND ME)

Sessional Marks: 30 University Exam Marks: 70

## UNIT I

**Environmental Studies and Natural Resources-**Definition of environment, Scope and importance of Environment, Environmental studies, Need for public awareness.

**Renewable** and **Non Renewable Resources and associated problems and case studies-**Uses, consequences of exploitation and remedial measures- (i) Water resources, (ii) Forest resources, (iii) Land resources, (iv) Mineral resources, (v) Food resources, (v*i*) Energy resources.

## UNIT II

**Environmental pollution and Global Effects-** Definition, Causes, Effects, and control measures of pollution- Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution.

Solid waste Management- Causes, effects and disposal methods; Role of an individual in prevention of pollution; case studies.

Climate changes- Global warming, Acid rain, Ozone depletion

### UNIT III

Disaster management- Earthquakes, cyclone, avalanches, land slides, Tsunami.

**Environment and Human health**- Epidemic diseases and pathology of Hepatitis-b, HIV/AIDS, Malaria, Typhoi, Chikungunya, Avian Flue, anthrax, *etc*.

Water Conservation- Rain water harvesting- watershed management.

Waste land reclamation.

#### UNIT IV

**Ecosystem-** Definition -Structure and functions of an ecosystem; types of ecosystems. **Biodiversity and its conservation-** Importance of biodiversity -Hot-spots of biodiversity, India as a mega-diversity nation; Threats and Conservation of biodiversity. Case Studies.

#### UNIT V

Social Issues- Population Explosion, Sustainable Development

**Environmental** Impact Assessment, Environmental Risk assessment (ERA), Clean Production and Life cycle assessment.

**Environment Legislation:** Environmental Protection Act, Water Act, Air Act, Wild Life Protection Act, Forest Conservation Act, Issues involved in Enforcement of Environmental legislation.

# **REFERENCE BOOKS:**

- 1. Kaushik & Kaushik Environmental Studies" McGraw Hill, New York, 1996.
- Canter, L.W., "Handbook of Environmental Impact Assessment Vol.I and II", The World Bank, Washington, 1991.
- Pelczer, Jr., M. J., Chan, e. C. S., Krieg, R. Noel., and Pelczar Maerna Foss, "Microbiology", 5<sup>th</sup> Edn., Tata McGraw Hill Publishing Company Lmited, New Delhi – 1996.
- 4. METCALF & EDDY, INC. "Wastewater Engineering Treatment Disposal, and Reise', Third Edition, Taya McGraw Hill Publishing Company Limited, New Delhi-1995.
- CSSEY.I.J. 'Unit Treatment processes in and Waste water Engineering', John Wiley & Sons England 1993.

# **BST06 ENGINEERING MATHEMATICS – II**

## UNIT – I

**Laplace Transforms**: Laplace transforms of standard functions, Transform of Periodic functions, Step function, Inverse transforms of derivatives and integrals, Convolution theorem, applications to solutions of ordinary differential equations.

## UNIT - II

**Matrices:** Rank, solution of system of linear equations, Eigen values, Eigen vectors, Cayley Hamilton theorem, Quadratic forms – Diagonalization.

## UNIT – III

**Partial Differential Equations:** Formation of PDEs by elimination of arbitrary constants and arbitrary functions, Method of separation of variables, one dimensional wave equation, heat equation, Laplace equation.

# $\mathbf{UNIT} - \mathbf{IV}$

**Solution of Algebraic and Transcendental Equations:** The Bisection Method – The Method of False Position– Newton-Raphson Method, Solution of linear simultaneous equation by Gauss elimination method, Gauss matrix and Gauss – Seidal iteration method.

Interpolation: Newton's forward and backward interpolation formulae – Lagrange's formulae.

## $\mathbf{UNIT}-\mathbf{V}$

Numerical Integration: Trapezoidal rule – Simpson's 1/3 Rule – Simpson's 3/8 Rule.

**Numerical solution of Ordinary Differential equations:** Solution by Taylor's series-Picard's Method of successive Approximations-Euler's Method, Runge-Kutta Methods, Predictor-Corrector Method-Milne's Method.

## Text books:

- 1. Higher Engineering Mathematics, 42nd Edition, Grewal, B.S., Khanna Publications, New Delhi.
- 2. Engineering Mathematics, Vol-I, II, Dr. M.K. Venkata Raman, National Publishing Co., Madras.
- 3. Advanced Engineering Mathematics, 9<sup>th</sup> Edition, Erwin Kresyzing, Wiley Eastern Ltd., New Delhi.
- 4. Engineering Mathematics, 6<sup>th</sup> Edition, B.V. Ramana, Tata McGraw Hill, New Delhi.

Impurities in water,

### **UNIT 1** :

### WATER TREATMENT

Hardness of water and its units, Disadvantages of hard water, Boiler feed water, scale and sludge formation in boilers, priming and foaming, Caustic embrittlement and boiler corrosion. Softening methods-lime soda, Zeolite and ion-exchange process, specification of potable water and purification of Drinking water.

#### **UNIT 2:**

### ELETRO CHEMISTRY AND CORROSION

Galvanic cells, Nernst equation, electrode potential, reference electrodes: hydrogen, calomel and glass electrode, Batteries: Rechargeable batteries (Lead acid, Ni-cd, Lithium ion Batteries), Fuels cells : (Hydrogen-oxygen and Methanol-oxygen, solid oxide)

**Corrosion:** Introduction, Type of corrosion, factors affecting the corrosion, Prevention: cathodic protection, Inhibitors (Anodic and Cathodic), electroplating.

# **UNIT 3:**

### POLYMERS

Basic concepts of polymerization, Types of polymerization, Plastomers: Thermosetting and Thermoplastics, preparation, properties and applications of polythene, Nylon, Teflon and Bakelite, Natural Rubbers: Processing of natural rubbers, compounding of Rubber Synthetic Rubber: Preparation, properties and applications of Buna-N, Thiokol and silicon rubbers, Polymers in medicine and surgery

### UNIT4:

#### **FUELS AND COMBUSTION**

Introduction, Classification of fuels, calorific value and its determination, bomb calorimeter, boys gas calorimeter, theoretical calculation of calorific value of fuel, coal-classification and Analysis, Metallurgical coke, petroleum-refining of petroleum, synthetic petrol, combustion, mass analysis from volume analysis and vice versa, analysis of flue gas by Orsat's apparatus.

### UNIT-5

### **CHEMISTRY OF ENGENEERING MATERIALS**

Cement: Composition, classification, preparation, setting and Hardening and analysis of cement. Refectories: Introduction, classification, properties and engineering applications.

Ceramics-Classification, properties and engineering applications.

Lubricants: Introduction, Classification, theory of lubrication, properties and engineering applications.

# Text books:

1.Engineerning chemistry , First Edition, Jayaveera KN, Subba Reddy GV and Ramachandraiah C, McGraw Hill Higher Education, New Delhi,2013

2.A Text Book of Engineering Chemistry, 15<sup>th</sup> Edition , Jain and Jain, Dhanapathi Rai Publications, New Delhi,2013

# **References:**

1. A Text Book of Engineering Chemistry 12th Edition, SS Dhara, Uma, S. Chand Publications,

New Delhi, 2010.

2. A Text Book of Engineering Chemistry, First Edition, K.B. Chandra Sekhar, UN.Das and sujatha fMishra, SCITECH Publications India Pvt Limited, 2010.

3. Engineering Chemistry, First Edition, Seshamaheswaramma K and Mridula Chugh, Pearson Education, 2013.

### **CST02 DATA STRUCTURES**

### UNIT-I

An overview of C++ Programming, OOPS Concepts, Data Abstraction with C++, Concept of the Inheritance, Concept of Polymorphism, Friend Functions, Inline Functions, Exception Handling.

#### $\mathbf{UNIT} - \mathbf{II}$

Introduction to Data Structures, Types of Data Structures, Abstract Data Types, Complexity of an algorithm, Arrays; Linked Lists : Introduction, Single Linked List, Double, Circular Lists, Stacks, Queues and their Operations and Applications.

## UNIT – III

**Trees**: Basic Terminologies- Definition and Concepts- Representations of Binary Tree- Operation on a Binary Tree- Types of Binary Trees-Binary Search Trees, Heap Trees, Height Balanced Trees, AVL Trees, B-Trees.

**Graphs**: Introduction- Graph terminologies- Representation of graphs- Operations on Graphs-Application of Graph Structures: Shortest path problem- topological sorting.

#### $\mathbf{UNIT} - \mathbf{IV}$

**Hashing:** Basic Concepts of Hashing Methods, Hash Tables, Choosing a hash Function, Collision Resolutions, File Organisation- Sequential File Organization, ISAM, Direct Files.

#### UNIT - V

**Sorting**: Internal Sorting Techniques: Selection sort, Bubble sort ,Merge sort Quick sort, heap sort and Radix sort; Introduction to external sorting; Searching Techniques; Linear and Binary search.

# **Text Books**:

- 1. Herbert Schildt; C++ ;Complete Reference C++.Fourth edition 2003
- 2. S.Sahni, "Data Structures, Algorithms and Applications in C+ +" Second Edifion, Orient Longman Pvt.ltd
- 3. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C + +", Pearson Education, Second Edition.
- 4. 1. "Classic Data Structures", Second Edition by DebasisSamanta, PHI.

### **Reference Books:**

- 1. J.P. Trembly and P.G. Sorensen, "An Introduction to Data Structures with Applications". Tata McGraw Hill, Third edition.
- 2. E.Horowitz and S. Sahani, "Fundamentals of Data Structures", Galgotia Book Source.
- 3. SartajSahni, "Data Structures, Algorithms and Applications in C++" Tata McGraw-Hill International Editions

### **MET03 ELEMENTS OF MECHANICAL ENGINEERING**

Credits – 4 L: T: P::4: 0:0

#### UNIT – I

Introduction to Thermodynamics – Concept of a system – Types of Systems, Thermodynamic Equilibrium – Properties, State, Process and Cycle, Zeroth Law, Energy Interactions – Heat and work, Types of work. First and Second Laws of Thermodynamics: First law, Cycle and process, Specific heats, Heat interactions in a closed system for various processes, Limitations of First law, Concept of Heat Engine (H.E.) and reversed heat engine (Heat pump and refrigerator), Efficiency/COP, Second Law: Kelvin – Plank and Clausius Statements, Carnot Cycle, Carnot Efficiency, Property of Entropy – T-S and P – V diagrams

#### $\mathbf{UNIT} - \mathbf{II}$

Thermal Power Plant: Thermal power plant layout – Four circuits – Rankine cycle, Boilers: Fire tube Vs Water Tube; Bob Cock and Wilcox, Cochran Boilers, Steam Turbines, Impulse Vs. Reaction Turbines, Compounding of Turbines.

#### UNIT – III

Internal Combustion Engines (IC): I.C. 2 – Stroke and 4 – Stroke engines – S.I. engines and C.I. engines – Differences Heat transfer – Modes – Thermal resistance concept, Conduction, Composite walls and Cylinders. Combined Conduction and Convection – Overall Heat transfer Coefficient, Simple Numerical Problems in Heat transfer.

## $\mathbf{UNIT} - \mathbf{IV}$

Manufacturing Processes : Engineering Materials ; Classification , Properties of materials, Metal Casting, Moulding, Patterns, Hot working and Cold working , Extrusion, Forging, Rolling and Drawing. Machine Tools and Machining Processes – Lathe Machines and Lathe operations, Milling machines, Types – Milling operations , Shaper, Planer, Drilling and Grinding machines. Welding – Gas welding, Arc Welding, Soldering and Brazing

### $\mathbf{UNIT}-\mathbf{V}$

Power Transmission – Transmission of Mechanical Power, Belt drives, Simple Numerical Problems, Gear Drives – Simple Numerical Problems

Basics of Automotive vehicle - Brakes - Types - Clutch and Differential.

### **Text Books:**

- 1. Mathur, M.L., Mehta F.S. and Tiwari R.P., Elements of Mechanical Engineering, Jain Brothers, New Delhi, 2011.
- 2. Roy K.P. and HazraChowdary, S.K., Elements of Mechanical Engineering, Media Promoters and Publishers Pvt., Ltd, 2002.
- 3. Rudramoorthy R., Thermal Engineering, Tata McGrawHill Book Company, New Delhi, 2003.
- 4. Hazra Chowdary, S.K., and Bose, Workshop Technology, Vol. I and II, Media Promoters and Publishers Pvt. Ltd., 2002.

### **EET01 CIRCUITS AND NETWORKS-I**

Credits – 4 L: T: P::4: 0:0

#### UNIT - I

Active and passive elements – Ideal and practical sources – Source transformation – V –I Characteristics of R.L and C elements – Kirchhoffs laws – Network reduction techniques – Star – delta transformation – Concept of mutual inductance – Concept of coupling and dot convention.

#### UNIT - II

Mesh and nodal analysis – Concept of super mesh and super node. Elements of network topology – Graph, tree, incidence matrix, and tie set and cut set matrices – formulation of equilibrium equations based on graph theory. Duality and dual circuits.

### $\mathbf{UNIT}-\mathbf{III}$

Periodic waveforms – Average and effective values of different waveforms – From factor and crest factor. Phase and phase difference – Phasor notation – Concept of reactance, impedance, susceptance, and admittance – Active and reactive power – Power factor – Power triangle. Response of R, L, and C elements for sinusoidal excitation Steady state analysis of RL, RC and RLC circuits for sinusoidal excitation – Phasor diagrams. Steady state analysis of ac circuits including coupled circuits using mesh and nodal analysis.

#### $\mathbf{UNIT} - \mathbf{IV}$

Series and parallel resonance – Half power frequencies, bandwidth, Q factor and relations between them. Impedance and admittance locus diagrams of RL and RC series circuits and two branch parallel circuits.

### $\mathbf{UNIT} - \mathbf{V}$

Network theorems – Superposition – Thevenin's and Norton's theorems – Millman's theorem – Reciprocity theorem – Tallegen's theorem – Compensation theorem and application of the theorems for dc circuits and sinusoidal steady state circuits – Maximum power transfer theorems for dc and ac circuits.

## **TEXT BOOKS:**

- 1. Circuits A, Bruce Carlson (THOMOSON)
- 2. Engineering Circuit Analysis Hayt, Kimmerly and Durbin (Tata Mc Graw Hill)
- 3. Electric circuits alexandeer & sadiku (mc graw hill)
- 4. Network analysis roy choudary (new age international)

## MEP02 : WORKSHOP PRACTICE (COMMON TO ALL BRANCHES)

# Carpentry

Wood sizing exercise in planning, marking, sawing, chiseling and grooving to prepare

Half – lap joint

- 1. Dove tail joint
- 2. Tenon joint

# Fitting

Markings, cutting and filing to prepare

- 1. Straight fitting
- 2. V fitting
- 3. Square fitting

# Tin smithy

Markings, bending and cutting to prepare

- 1. Round tin
- 2. Square tin

# Foundry

Ramming and placing of riser and runner to prepare the moulds for the following

- 1. Two stepped pulley
- 2. Three stepped pulley
- 3. Dumbell

# **Electrical Wiring Shop:**

Safety rules and practices in wiring, basic circuits, Common House wiring connections such as parallel and series connections, bell circuit.

# **Reference Text Books:**

- 1. Workshop Manual by K. Venkat Reddy
- 2. Elementary Workshop Technology by Hazara Chowdary & Bhattaaaacharya
- 3. Workshop Technology Vol I & II by Raghuvamsi.
### Credits: 1

# LIST OF EXPERIMENTS (Minimum Seven are Mandatory)

- 1. To determine the strength of KMnO4 solution by titrating it against a standard solution of Oxalic acid.
- 2. Determination of hardness of water by EDTA method.
- 3. Estimation of acidity of Water
- 4. Estimation of Dissolved oxygen in water sample
- 5. Determination of Iron by using potassium dichromate
- 6. Estimation of copper by EDTA method
- 7. Estimation of chloride in water sample.
- 8. Conductomeric titration of strong acid with strong base
- 9. Potentiometric titration of Iron by dichrometry method
- 10. Colorimetric estimation of manganese
- 11. Estimation of Glucose

### CSP02 DATA STRUCTURES LAB

### List of Experiments/Tasks

- 1. Write a program to sort the elements of an array using sorting by exchange.
- 2. Write a program to sort the elements of an array using Selection Sort.
- 3. Write a program to implement heap sort.
- 4. Write a program to perform Linear Search on the elements of a given array.
- 5. Write a program to perform Binary Search on the elements of a given array.
- 6. Write a program to convert infix expression to postfix expression and evaluate postfix expression.
- 7. Write a program to implement stack, queue, circular queue using arrays and linked lists.
- 8. Write a program to perform the operations creation, insertion, deletion, and traversing a singly linked list.
- 9. Write a program to perform the operations creation, insertion, deletion, and traversing a Doubly linked list.
- 10. Write a program to remove duplicates from ordered and unordered arrays.
- 11. Write a program to sort numbers using insertion sort.
- 12. Write a program to implement quick sort using non-recursive and recursive approaches. Use randomized element as partitioning element.
- 13. Write a program to search a word in a given file and display all its positions.
- 14. Write a program for tic-tac-toe game.
- 15. Write a program to perform operations creation, insertion, deletion and traversing on a binary search tree.
- 16. Write a program to implement depth first search and breadth first search on graphs.
- 17. Write a program to perform different operations on Red Black trees.
- 18. Write a program to implement external sorting.
- 19. Write a program to perform different operations of B Tree.

### **References:**

- 1. Fundamentals of Data Structures in C", Horowitz, Sahni, Anderson-freed, Second Edition, Universities Press.
- 2. Data structures and Algorithms using C++, Ananda Rao Akepogu and Radhika Raju Palagiri, Pearson Education

**B.Tech** 

# II YEAR I SEMESTER

### **B.Tech**

#### Course S.No **Course Title** Code Engineering Mathematics-III BST07 1 2 BST09 Managerial Economics& Financial Analysis 3 EET02 Circuits & Networks-II 4 ECT03 **Digital Electronics** 5 EET03 Electrical Machines-I ECT04 **Electronic Circuits** 6 7 ECP14 Electronic Devices & Circuits Lab 8 EEP01 Circuits & Networks Lab

### **II YEAR I SEMESTER**

#### **BST07 - ENGINEERING MATHEMATICS – III**

Credits – 4 L: T: P::4: 0:0

### UNIT – I

**Fourier Series:** Determination of Fourier coefficients – Fourier series – Even and odd functions – Fourier series in an arbitrary interval – Even and odd periodic continuation – Half-range Fourier sine and cosine expansions- Parseval's formula.

#### UNIT - II

**Fourier Transforms:** Fourier integral theorem (only statement) – Fourier sine and cosine integrals. Fourier transform – Fourier sine and cosine transforms – Properties – Inverse transforms – Finite Fourier transforms.

#### UNIT – III

**Special Functions:** Beta , Gamma and Bessel functions- Legendre polynomials-recurrence formulae - generating functions for  $J_n(X)$  and  $P_n(X)$ - Rodrigue's formula-orthogonality of Legendre polynomials.

### $\mathbf{UNIT} - \mathbf{IV}$

**Complex Functions-I:** Analytical functions- Cauchy-Riemann equations-Conformal mapping-Bilinear transformations of  $-e^z$ ,  $z^2$  sinz and cosz.

#### $\mathbf{UNIT} - \mathbf{V}$

**Complex Analysis-II:** complex integration –Evaluation of integrals-Cauchy's theorem- integral formula-Singularities-Poles –Residues-Contour Integration.

#### Text books:

- 1. Grewal, B.S. Higher Engineering Mathematics
- 2. Venkataraman, M.K., Engineering Mathematics Vol. I & II
- 3. Venkataraman, M.K., Engineering Mathematics Third Year Part A & B
- 4. Erwin Kresyzing, Advanced Engineering Mathematics.
- 5. B.V.Ramana Engineering Mathematics Tata McGrawHill.

#### **BST09-MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**

Credits – 4 L: T: P::4: 0:0

#### UNIT – I

**INTRODUCTION TO MANAGERIAL ECONOMICS:** Management Economics: Definition, Nature and Scope. **DEMAND ANALYSIS:** Law of Demand, Demand Determinants **ELASTICITY OF DAMAND:** Definition, Types and Demand Forecasting methods.

#### UNIT – II

**THEORY OF PRODUCTION:** Firm and Industry- Production Function – Cobb Douglas Production Function- Laws of returns- internal and external economies of scale. **COST ANALYSIS:** Cost Concepts: Fixed Vs Variable costs, explicit Vs implicit costs, Out-of-pocket costs Vs imputed costs, Opportunity cost, Sunk costs and abandonment costs.

**BREAK-EVEN ANALYSI**: Concept of Break-even point (BEP)- Break-even Chart, Determination of BEP in volume and value. Assumptions underlying and practical significance of BEP (Simple problems).

#### UNIT- III

Introduction to Markets and Business Organisations: Market structure, types of competition, features of Perfect competition, Monopoly, Monopolistic competition- Price output determination.

**TYPES OF BUSINESS ORGANISATIONS:** Features, Merits and Demerits of Sole Trading Proprietorship, Partnership, Joint Stock Companies including Public and Private sector companies.

### $\mathbf{UNIT} - \mathbf{IV}$

**INTRODUCTION TO FINANCIAL ACCOUNTING AND FINANCIAL ANALYSIS:** Double Entry Book Keeping- Journal, Ledger, Trial Balance, Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments. **RATIO ANALYSIS:** Computation of Liquidity Ratios (current ratio and quick ratio), Activity Ratios (Inventory Turnover ratio, Debtors Turnover ratio) Capital Structure Ratios (Debt-equity Ratio and Interest Coverage Ratio) and Profitability Ratios (Gross Profit Ratio, Net Profit Ratio, Operating Ratio,, P/E Ratio and EPS) Analysis and interpretation.

#### $\mathbf{UNIT}-\mathbf{V}$

**FUNDAMENTALS OF FINANCE AND CAPITAL BUDGETING:** Capital and its significance-Types of Capital, Estimation of Fixed and Working Capital, requirements and methods of raising capital. **CAPITAL BUDGETING METHODS:** Pay back method, Accounting Rate of Return (ARR) and Net Present Value (NPV) and IRR methods (simple problems).

### **TEXT BOOKS:**

- 1. Joel Dean, 'Managerial Economics', PHI 2001
- 2. James C. Van Home, 'Financial Management Policy'
- 3. I.M Pandey, Management Accounting. Third Revised Edition

Credits – 4 L: T: P::4: 0:0

#### UNIT – I

**Three Phase Circuits:** Advantages of three phase systems – Phase sequence – Balanced and Unbalanced systems – Magnitude and phasor relationships between line and phase voltages and currents in balanced star and delta circuits – Analysis of balanced and unbalanced three phase circuits with star and delta connected loads – Neutral displacement voltage – Analysis by star-delta conversion.

Measurement of three phase power by two-wattmeter methods – Measurement of three phase reactive power by single wattmeter

### $\mathbf{UNIT} - \mathbf{II}$

**Transient Analysis**: Transient response of RL, RC, and RLC circuits for DC and sinusoidal excitations – Determination of initial conditions – Concept of time constant – Transform circuit analysis – Laplace transforms of signals and periodic functions and initial and final value theorems – Applications for transient response of RL, RC, and RLC circuits.

#### UNIT – III

**Network Functions:** One-port and Two-port networks – Driving point and transfer functions of networks – Properties of driving point and transfer functions – Concept of complex frequency, poles and zeros – Time domain response from pole-zero diagram – Restrictions on pole-zero locations.

#### $\mathbf{UNIT}-\mathbf{IV}$

**Two-port Parameters :** Open circuit impedance and short circuit admittance parameters – Hybrid and inverse-hybrid parameters – Transmission and inverse transmission parameters – Inter relationships between parameter sets – Series, Parallel, and Cascade connection of two-ports – Conditions for reciprocity and symmetry of two-port networks in terms of different parameters – Terminated two-port networks – Image parameters.

### UNIT – V

**Elementary Ideas of Network Synthesis**: Conditions for reliability – Hurwitz polynomials – Positive real functions – Properties and realization of RL, RC, and LC admittance functions by Foster and Cauer methods – Canonical realization.

### **TEXT BOOKS:**

- 1. Van Valkenburg, Network Analysis, 3/e, Pearson Education
- 2. Hayt and Kimmerly, Network Analysis, Tata McGraw-Hill
- 3. Wadhwa, Network Analysis, 4/e, New Age International (P) Ltd.
- 4. Sudhakar and Shyammohan, Circuits and Networks, 3/e, Tata McGraw-Hill
- 5. Edminister, Electric Circuits, McGraw-Hill Schaum Series 4/e

### UNIT I

### PRINCIPLES OF ELECTROMECHANICAL ENERGY CONVERSION

Electromechanical Energy Conversion – Forces and Torque In Magnetic Field Systems – Energy Balance– Energy and Force in A Singly Excited Magnetic Field System, Determination of Magnetic Force - Co-Energy – Multi Excited Magnetic Field Systems.

#### UNIT II

### **D.C. GENERATORS –I**

D.C. Generators – Principle of Operation – Constructional Features – Armature Windings – Lap and Wave Windings – Simplex and Multiplex Windings – Use of Laminated Armature – E. M.F Equation–Numerical Problems – Parallel Paths-Armature Reaction – Cross Magnetizing and De-Magnetizing AT/Pole – Compensating Winding – Commutation – Reactance Voltage – Methods of Improving Commutation.

#### UNIT III

#### **D.C GENERATORS – II**

Methods of Excitation – Separately Excited and Self Excited Generators – Building up of E.M.F – Critical Field Resistance and Critical Speed - Causes for Failure to Self Excite and Remedial Measures-Load Characteristics of Shunt, Series and Compound Generators – Parallel Operation of D.C Series Generators – Use of Equalizer Bar and Cross Connection of Field Windings – Load Sharing.

#### UNIT IV

### **D.C. MOTORS**

D.C Motors – Principle of Operation – Back E.M.F. – Circuit Model – Torque Equation – Characteristics and Application of Shunt, Series and Compound Motors – Armature Reaction and Commutation. Speed Control of D.C. Motors: Armature Voltage and Field Flux Control Methods. Ward-Leonard System–Braking of D.C Motors – Permanent Magnet D.C Motor (PMDC).

Motor Starters (3 Point and 4 Point Starters) – Protective Devices-Calculation of Starters Steps for D.C Shunt Motors.

#### UNIT V

#### **TESTING OF DC MACHINES**

Losses – Constant & Variable Losses – Calculation of Efficiency – Condition for Maximum Efficiency. Methods of Testing – Direct, Indirect – Brake Test – Swinburne's Test – Hopkinson's Test – Field's Test – Retardation Test.

#### **Text Books:**

1. Electric Machines by I.J. Nagrath & D.P. Kothari, Tata Mc Graw – Hill Publishers, 3rd Edition, 2004.

2. Electrical Machinery Fundamentals by Stephen J Chapman, Mc Graw Hills, 2005.

#### **Reference Books:**

1. Performance and Design of D.C Machines – by Clayton & Hancock, BPB Publishers, 2004.

2. Electrical Machines -S.K. Battacharya, TMH Edn Pvt. Ltd., 3rd Edition, 2009.

3. Electric Machinary – A. E. Fritzgerald, C. Kingsley and S. Umans, Mc Graw-Hill Companies, 5th Editon, 2003.

- 4. Electrical Machines M.V Deshpande, Wheeler Publishing, 2004.
- 5. Electrical Machines P.S. Bimbhra., Khanna Publishers, 2011.
- 6. Electromechanics I Kamakshaiah S., Overseas Publishers Pvt. Ltd, 3rd Edition, 2004.

### **ECT03-DIGITAL ELECTRONICS**

### (Common to EEE and ECE)

Credits – 4 L: T: P::4: 0:0

### UNIT-I

**Number Systems and Codes:** Review of binary, octal, decimal and hexadecimal number systems and their interconversion. BCD, Grey, ASCII, Parity bit.

**Boolean Algebra and Logic Gates:** NOT, OR, AND operations. Boolean theorems, De morgan's theorem, Symbols and truth tables of logic gates (NOT, OR, AND, NAND, NOR, XOR, XNOR), Universal gates, IEEE standard logic symbols.

### UNIT-II

**Combinational logic circuits:** Standard forms of logical functions, Minterm and maxterm specifications, Simplification by K-maps, Incompletely specified functions, Realization of logical functions using gates, Decoders and encoders, Multiplexers and demultiplexers, Digital magnitude comparator.

### UNIT-III

**Sequential circuits:** Latches, Clocked flip-flops, SR, JK, D and T flip flops, Timing problems and master-slave flip-flops, Shift registers, Asynchronous and synchronous counters, Ring and Johnson counters, Application of counters.

### UNIT-IV

Arithmetic circuits: Signed binary numbers, Binary arithmetic, Binary adders and subtractors, Serial and parallel adders, Integrated-circuit parallel adder and its applications, Binary multipliers, ALU.

### UNIT-V

**Memory Devices:** Terminology, ROM, PROM, EPROM, EEPROM, CDROM. Semiconductor RAM and its architecture, SRAM, DRAM, Memory expansion.

### **Text Books:**

- 1. Ronald J.Tocci, Neal S.Widmer, "Digital systems Principles and applications". 8<sup>th</sup> edition, Pearson Education Asia, 2001.
- Virendra kumar, "Digital technology Principles and applications", New age International publishers, 1998.

### **References:**

- 1. Taub and schilling, "Digital integrated Electronics", Mc Graw-Hill Co.
- 2. John M, Yarbrough, "Digital logic applications and design", Thomson-Brooks India edition.
- 3. S.Salivahanan and S.Arivazhagan", Digital circuits and design", Vikas Publishing house.

#### **ECT04-ELECTRONIC CIRCUITS**

Credits – 4 L: T: P::4: 0:0

#### UNIT-I

**Rectifiers:** Diode equivalent circuits, Analysis of diode circuits, Characteristics and comparison of Halfwave, Full-wave and bridge rectifiers, Analysis of filters(C, L, LC, and CLC) used with Full-wave rectifier.

**General Amplifiers:** Concept of Amplifier, Voltage gain, Current gain, Power gain, Input and Output resistances, conversion efficiency, Frequency response, Bandwidth, distortion, Classification of amplifiers.

#### **UNIT-II**

**BJT Amplifiers:** BJT biasing schemes, Hybrid model, Small signal analysis of single stage BJT amplifiers, Comparison of CE,CB and CC amplifiers, approximate model analysis, Effect of coupling and bypass capacitors on low frequency response, Hybrid  $\pi$  model at high frequencies, Parameters f<sub>B</sub> and f<sub>T</sub>.

#### **UNIT-III**

**FET Amplifiers:** FET biasing schemes, Small signal model, Analysis of CS, CD and CG amplifiers. High frequency response.

#### **UNIT-IV**

**Multistage Amplifiers:** Types of Coupling, choice of Amplifier configuration, overall voltage gain and Bandwidth of nstage amplifier, Darlington and Bootstrap circuits.

**Power Amplifiers:** Class-A large signal amplifiers, Transformer coupled audio power amplifiers, Push pull amplifiers, Class B amplifiers, Class AB operation, Complementary symmetry power amplifier.

#### UNIT-V

**Feedback Amplifiers:** Feedback concept, classification, Effects of negative feedback on gain, Stability, Noise, Distortion, Bandwidth, Input and Output resistances, Different types of feedback circuits without analysis.

**Sinusoidal oscillators:** Barkhausen criterion, RC Phase shift, Wein Bridge, Hartley and Colpitts oscillators, Crystal oscillators.

#### **TEXT BOOKS:**

- 1. Milliman and Halkias," Integrated Electronics", Mc Graw Hill &Co.
- 2. Moottershed," Electronic Devices and Circuits", PHI.

# **REFERENCES: 1**S.Shalivahanan, "Electronic Devices and Circuits", TMH 2.David A. Bell," Electronic Devices and Circuits", PHI

### **ECP14 - Electronic Devices and Circuits Lab**

### **List of Experiments**

- 1. PN Junction Diode Characteristics
- 2. ZENER Diode Characteristics
- 3. Half Wave Rectifier
- 4. Full Wave Rectifier
- 5. SCR Characteristics
- 6. Common-Emitter amplifier.
- 7. Common-Base amplifier
- 8. Two stage RC coupled amplifier
- 9. RC Phase shift oscillator.
- 10. Colpitts or Hartley oscillator.
- 11. JFET common-source amplifier
- 12. Bridge rectifier
- 13. Feedback amplifiers (Voltage shunt and current series)

Note: About 10 experiments have to be conducted.

### **EEP01: CIRCUITS AND NETWORKS LAB**

# Credits – 1 L: T: P::0: 0:2

### **List of Experiments**

- 1. Verification of Superposition Theorem
- 2. Verification of Thevenin's Theorem
- 3. Verification of Norton's theorem
- 4. Verification of Maximum power transfer theorem for DC
- 5. Verification of Reciprocity Theorem
- 6. To plot frequency response of a series resonant circuit
- 7. To plot frequency response of a parallel resonant circuit
- 8. Verification of Millman's Theorem
- 9. Verification of Compensation Theorem
- 10. Verification of Maximum power transfer theorem for AC

# **B.Tech**

# **II YEAR II SEMESTER**

S.No	Course Code	Course Title
1	ECT22	Signals & Systems with Random Process
2	ECT23	Pulse& Digital Circuits
3	EET04	Electro Magnetic Theory
4	EET05	Electrical Machines-II
5	MET10	Fluid Mechanics and Hydraulic Machinery
6	EET06	Power Systems-I
7	ECP15	Pulse& Digital Circuits Lab
8	MEP05	Fluid Mechanics and Hydraulic Machinery

### ECT22-SIGNALS AND SYSTEMS WITH RANDOM PROCESS

Credits – 4	Sessional Marks: 30
L: T: P::4: 0:0	University Exam Marks: 70

#### UNIT – I

**Continuous – Time signals:** Classification of signals – Orthogonality of signals – Dirac delta function – Unit step function – sign function – Sealing & Shifting of signals – Fourier – Fourier transform and its properties – Time Band – Width product – Transform of periodic and power signals – power and energy spectral densities – Auto and cross correlations of periodic and aperiodic signals.

#### $\mathbf{UNIT} - \mathbf{II}$

**Continuous – Time systems :** Classification of systems – Linearity, time invariance – Transmission of signals through linear time invariant systems – Convolution – Unit impulse response – Frequency response – Ideal low-pass filter – Hilbert transform – Pre and complex envelops – Bandpass signals through band pass systems.

#### UNIT – III

**Discrete time signals and systems :** Unit impulse and step functions – Linear shift invariant (LSI)systems – Stability and causality linear constant coefficient differ-rence equation – Impulse response – Discrete time Fourier transform its pro-perties–Time&frequency domain characterization of signals through LSI systems

#### UNIT - IV

**Random signals :** Probability – Bernoulli trails – Radom variable – Cumulative distribution function – Probability density function (PDF) – Binomial – poison – Uniform – Gaussian PDF's several random variables – Moments – Mean – Variance – Covariance – Correlation coefficient – Sum of random variables central limit theorem – transformation of random variables – Moment generation function and characteristic function of random variables.

#### $\mathbf{UNIT} - \mathbf{V}$

**Random process :** Stationarity – correlation and covariance functions – Cross correlation functions – Regularity – Ergodicity – Gaussian process – Transmission of random process through linear filter – Spectral densities – Noise – White Noise narrow – band noise – Impulse and quadrature components – Envelope and phase components.

#### **TEXT BOOKS :**

1.Silmon Hayki –Communication systems –Wiley Eastern ltd. Delhi (I, II, IV, V) 2.Oppenheisn, A.V.Wilsly, A.S.& Young, I.T– Signals &Systems– PHI – (I,II, III)

3. Aunon, J.I & Chandrasekhar V – Introduction to Probability & Random Process – MC Graw Hill, 1998

### **ECT23-PULSE AND DIGITAL CIRCUITS**

Credits – 4 L: T: P::4: 0:0

# UNIT – I

**Wave shaping circuits** : Types of waveforms, Characteristics of pulse waveforms. RC low pass and high pass circuits, their responses for step, pulse and square wave inputs, Rise time, Tilt, Square wave testing of amplifiers, Diode as a switch, Diode clipper and clamper circuits.

### UNIT – II

**Multivibrators** : BJT switch and switching times, Inverter, JFET switch, MOSFET and CMOS switches, Principle and operation of Bistable, Monostable, Astable multivibrators and Schmitt trigger using BJTs.

### UNIT – III

**Time Base Generators** : General features of time base signal, Methods of generating time base waveform, Exponential sweep circuit, Sweep circuit using UJT. Sweep circuit using a Transistor switch, Transistor constant current sweep, Miller and Boostrap time base generators using BJTs.

### $\mathbf{UNIT} - \mathbf{IV}$

**IC Timer & Murtivibrators** : CNOS monostable and astable multivibrators, 555 timer, Monostable and astble models, Dual timer and its applications.

### $\mathbf{UNIT} - \mathbf{V}$

**Digital integrated circuits** : Evaluation of ICs, Advantages and classification of ICs, Digital IC characteristic, Digital IC families, TTL, ECL, MOS, CMOS and their comprarison, Totem pole, Open collector, and Trcitate outputs, IC Packagings.

### **TEXT BOOKS:**

- 1. David A. Bell, "Solid State Pulse Circuits", PHI.
- 2. Taub and Schilling, "Digital Integrated Circuits" Mc Graw Hill.
- 3. Reynold J. Tocci, "Digital Systems Principles and applications", 8<sup>th</sup> edition. Pearson education.

### **Reference:**

- 1. Pulse and Digital circuits A Anand Kumar, PHI
- 2. Pulse, Digital and switching waveforms J Millman and H.Taub, Mc Graw Hill.

Credits – 4 L: T: P::4: 0:0

### UNIT – I

**ELECTROSTATIC FIELD:** Introduction - Coulomb's law – Electric field intensity – electric fields due to point, line, surface and volume charge distributions – Electric flux density – Gauss law – Electric potential – potential gradient – Divergence and divergence theorem – Poisson's and Laplace equations.

### UNIT - II

**ELECTROSTATIC APPLICATIONS:** Field due to dipoles – dipole moment – Current and current density – Conductors and Dielectrics - Boundary conditions – capacitance – Dielectric interface – Capacitance of system of conductors – Dielectric const & Dielectric strength -Energy stored in capacitor – Energy density

#### $\mathbf{UNIT}-\mathbf{III}$

**STEADY ELECTRO-MAGENTIC FIELDS:** Introduction – Biot - Savart Law – Ampere's Circuital Law – Applications – Curl – Stoke's theorem – Magnetic flux – Magnetic flux density – The Scalar and Vector magnetic potentials – Force on a moving charge and current elements – Force and Torque on closed circuit.

#### UNIT - IV

**MAGNETO STATICS AND APPLICATIONS:** Introduction to magnetic materials – Magnetization and Permeability – Magnetic boundary Conditions – Magnetic circuit – Potential energy and forces on Magnetic materials – Inductance and mutual inductance – Inductance of solenoids, toroids, and transmission lines – Faraday's Law – Time varying magnetic field.

#### UNIT - V

**ELECTROMAGNETIC FIELDS AND WAVE PROPAGATION:** Conduction current and Displacement current – Maxwell's equation in point and integral forms – Wave propagation in Dielectrics – Power and the Poynting Vector – Propagation in good conductors – Wave polarization.

#### **TEXT BOOKS:**

1. William Hayt," Engineering Electromagnetics, McGraw Hill, New york, 7th ed., 2005.

2 .K.A.Gangadhar, "Field theory", Khanna publishers, New Delhi, 15th edition, 2004.

### **REFERENCE BOOKS:**

1. David K Cheng, Field and Wave Electromagnetics, Pearson Edun, 2nd edn,2004.

2. John D. Kraus, "Electromagnetics" McGraw Hill, 5th Edition, 1999.

3 N. Narayana Rao, Elements of Engg. Electro Magnetics, PHI, 6<sup>th</sup> Edn., 2008

Credits – 4 L: T: P::4: 0:0

# UNIT I

#### SINGLE PHASE TRANSFORMERS

Single Phase Transformers- Constructional Details- EMF Equation -Operation on No Load and on Load -Phasor Diagrams Equivalent Circuit - Losses and Efficiency-Regulation. All Day Efficiency - Effect of Variations of Frequency & Supply Voltage on Iron Losses.

### UNIT II

#### PERFORMANCE OF SINGLE PHASE TRANSFORMERS

OC and SC Tests - Sumpner's Test - Predetermination of Efficiency and Regulation-Separation of Losses -Parallel Operation with Equal and Unequal Voltage Ratios - Auto Transformers-Equivalent Circuit - Comparison with two Winding Transformers.

#### UNIT III

#### THREE PHASE TRANSFORMERS AND INDUCTION MOTORS

Three Phase Transformers - Connections - Y/Y, Y/ $\Delta$ ,  $\Delta$ /Y,  $\Delta$ / $\Delta$  and Open- $\Delta$ , Third Harmonics in Phase Voltages-Three Winding Transformers-Tertiary Windings- Scott Connection.

Polyphase Induction Motors-Construction Details of Cage and Wound Rotor Machines-Production of Rotating Magnetic Field - Principle of Operation - Rotor Emf and Rotor Frequency - Rotor Reactance, Rotor Current and Pf at Standstill and During Operation.

#### **UNIT IV**

#### **3-PHASE INDUCTION MOTOR CHARACTERISTICS**

Rotor Power Input, Rotor Copper Loss and Mechanical Power Developed and Their Inter Relation-Torque Equation-Deduction From Torque Equation - Expressions for Maximum Torque and Starting Torque - Torque Slip Characteristic-Equivalent Circuit - Phasor Diagram - Circle Diagram-No Load and Blocked Rotor Tests-Predetermination of Performance

#### UNIT V

#### STARTING AND SPEED CONTROL OF INDUCTION MOTORS

Starting Methods and Starting Current and Torque Calculations, Speed Control–Generator Operation -Double Cage - Crawling and Cogging -Change of Frequency;Pole Changing and Methods of Consequent Poles; Cascade Connection. Injection of an EMF.

#### **Text Books:**

1. Electrical Machinery & Transformers by Irving Kosow –Pearson Publishers, Second Edition, 2012

2. Electric Machines -by I.J.Nagrath & D.P.Kothari, Tata Mc Graw Hill, 7th Edition., 2005

### **Reference Books:**

1. Performance and Design of AC Machines by MG.Say, BPB Publishers, 2002.

2. Theory of Alternating Current Machinery- by Langsdorf, Tata McGraw-Hill Companies, 2nd edition, 2008.

3. Electromechanics-II (transformers and induction motors) S. Kamakshaiah, Hitech publishers, 2005.

4. Electric Machinery - A.E. Fitzgerald, C.Kingsley and S.Humans, Mcgraw Hill Companies, 6th edition, 2003.

### MET10- FLUID MECHANICS AND HYRAULIC MACHINERY

### UNIT – I

Fluid properties: Mass density, weight density, specific volume, relative density, viscosity, compressibility, surface tension and capillarity and standard atmosphere pressure, Vapour pressure. Pressure Measurements: Piezometer, manometer differential manometers, micro manometers, velocity measurements- Pitot tube. Discharge measurement: Orifice and mouthpiece- venturimeter, Orifice meter and Nozzle-meter

### UNIT –II

Fluid static's: Fluid pressure Pascal's law, absolute and gauge pressure, hydrostatic force on surfacestotal pressure and center of pressure on plane surfaces.Fluid kinematics: Type of fluid flow, type of flow lines, rate of flow, velocity potential and stream function continuity equation.Fluid dynamics: Eluer's equation- Bernoulli's equation and its application momentum equation and moment of momentum equation.

#### UNIT –III

Laminar flow: Relationship between shear stress and pressure gradients- laminar flow through circular pipes- Hagen poisulle law- loss of head due to friction.Turbulent flow: Loss of head due to friction in pipe- Darcy- Wersbach equation Minor head losses- pipes in series and parallel siphon.

Boundary layer concept: Boundary layer growth over a flat plate- Boundary layer thickness, displacement thickness, momentum thickness and energy thickness- turbulent boundary layer-separation of boundary layer.Flow around submerged objects: Drag and lift- types of drag on flat and cylinder lift on circular and air foils.

### UNIT IV

Impact of water jets Hydrodynamic forces of jets on stationary and moving flat, inclined and curved vanes – Jet striking centrally and at tip- Velocity triangle at inlet and outlet – work done and efficiency.Turbines – Classification of Hydraulic turbines – Pelton Wheel, Francis turbine, Kaplan working principle - Work done and efficiency of Pelton wheel, Francis, Kaplan turbine - Draft tube - Specific speed unit quantities – Specific speed - Performance characteristics – Model testing.

#### UNIT –V

Centrifugal pumps – Classification of pumps – Working of a centrifugal pump work done by the impeller on liquid – Heads and efficiencies – Multi – stage centrifugal pumps – Specific speed – Performance characteristics – Model testing.Reciprocating Pumps Classification of Reciprocating Pumps – Working of a reciprocating pump – Coefficient of discharge and slip – Single acting and double acting reciprocating pumps.Hydraulic Systems, Pneumatic Control Systems and Actuators.Hydraulic devices - Hydraulic accumulator, Hydraulic intensifier, Hydraulic press, Hydraulic ram, Hydraulic crane and Hydraulic lift – Hydraulic coupling Hydraulic torque converter – Introduction to pneumatic control systems and actuators. **TEXT BOOKS:** 

# 1. Anthony Esposito: Fluid Mechanics with Applications, 4th Edition, Prentice Hall,

- 1998.
- 2. Rajput R.K.: Fluid Mechanics and Fluid Machinery, S. Chand & Company Limited, 2008.
- 3. Bhansal R.K.: Fluid Mechanics and Fluid Machinery, 9th Edition,Laxmi Publication,2005.

#### **REFERENCES:**

1. P. N. Modi, S. M. Seth: Hydraulics and Fluid Mechanics,8th Edition, Standard Book House, 1987

### UNIT-I

# ECONOMIC ASPECTS OF POWER STATIONS

Types of Loads-Load curve, load duration and integrated load duration Curves-Load Factor-Demand Factor-Diversity Factor-Capacity Factor-Utilization and plant use factors -Costs of electrical Energy-Types of tariffs.

### **UNIT-II**

**SUBSTATIONS**: Number, Size, Location and Installation of substations-The main equipments in substations-Bus bar arrangements, key diagram of a typical primary substation.

**INSULATORS**: Introduction-Types of insulators-Potential distribution over a string of insulators-Methods of equalizing the potential, string efficiency-Testing of insulators.

# UNIT-III

### **DC DISTRIBUTION**

Introduction-Classification of distribution Systems-Connection schemes of distribution systems (radial, ring main, interconnected systems)-Numerical problems in D.C distributors for the following cases: distributor fed at one end (concentrated and uniform loading), fed at both ends(concentrated and uniform loading) and ring main distributor.

### AC DISTRIBUTION

Design considerations of distribution feeders: radial and loop types of primary feeders, voltage levels, feeder loading-basic design practice of the secondary distribution system-numerical problems in AC distributors for the following cases: power factors referred to the receiving end voltage and with respect to respective load voltages.

#### UNIT-IV

### INDUCTANCE AND CAPACITANCE CALCULATIONS OF TRANSMISSION LINES

Line conductors-Resistance-Inductance and capacitance of single phase and three phase lines with symmetrical and unsymmetrical spacing -Bundled conductors-Effect of earth on capacitance- Method of Images.

Acsr, Bundled and standard conductors- Resistance for solid conductors Skin effect- single and double circuit lines, Concept of GMR & GMD, Symmetrical and Asymmetrical conductor configuration with and without Transposition, Numerical problems, Single and double circuit lines, Effect of ground on capacitance, Numerical problems.

#### UNIT-V

### MECHANICAL DESIGN OF TRANSMISSION LINE-METHOD OF IMAGES

The Catenary Curve- Sag Tension Calculations-Support at different levels-Stringing Chart-Sag Template-Equivalent Spam.

**CORONA:** Introduction-Disruptive Critical Voltages- Factors affecting Corona loss-Methods of reducing Corona loss-Disadvantages of Corona-Interference between power and communication lines.

# **TEXT BOOKS**:

1. C..L.Wadhawa, "Generation Distribution and utilization of Electrical energy" New age publico.

2.B.R.Gupta, "Power system analysis and design" third edition, Wheeler publishing.

3.Principles of power systems by V.K.Mehta and Rohit Mehta S.CHAND & COMPANY LTD., New Delhi 2004

4. William D. Stevenson "Elements of power system analysis" fourth edition, MC Grawhill International editions.

5.AR Bergen and Vijay Vittal, "Power system analysis", Pearson education, 2001.

### **ECP15: PULSE AND DIGITAL CIRCUITS LAB**

# Credits – 1 L: T: P::0: 0:2

Sessional Marks: 40 University Exam Marks: 60

#### **List of Experiments**

- 1. Logic gates and simulation of gates using universal gates.
- 2. Flip flops.
- 3. Counters.
- 4. Shift register and Johnson Counter.
- 5. Decoders and Encoders.
- 6. Multiplexers and Demultiplexers.
- 7. Binary adders.
- 8. RC low pass and high pass circuits.
- 9. Clippers and Clampers.
- 10. Schmitt trigger.
- 11. Astable multi-vibrator using BJT.
- 12. 555 timer.
- 13. Time-base circuits.

Note: A minimum of 10 experiments have to be conducted.

### MEP05: FLUID MECHANICS& HYDRAULIC MACHINERY LAB

#### **List of Experiments**

- **1.** Rectangular Notch
- 2. Triangular Notch
- 3. Trapezoidal Notch
- 4. Rota meter test-rig
- 5. Performance Test on Multistage Centrifugal Pump
- 6. Orifice meter
- 7. Pelton wheel Turbine working
- 8. Impact of Jets on Vanes
- 9. Kaplan Turbine
- 10. Calibration of Venturimeter
- 11. Determination Of Friction Factor for A Given Pipe Line

# **B.Tech**

S.NO	COURSE CODE	COURSE TITLE
1	MET31	Power Plant Engineering
2	EET07	Control Systems
3	EET08	Electrical Measurements
4	ECT25	Analog& Digital IC Applications
5	EET09	Electrical Machines-III
6	EET10	Power Systems-II
7	EEP02	Electrical Machines-I Lab
8	ECP16	Analog& Digital IC Applications Lab

# III YEAR I SEMESTER

#### **MET31: POWER PLANT ENGINEERING**

#### UNIT–I

**Steam Power Stations:** Main parts and working of a steam station, fuel handling, ash handling, steam turbines, water steam flow, water treatment, ranking cycle, cooling water system for condensers. Types of boilers and their characteristics, characteristics of steam turbines, turbo alternators, and steam station lay out, cost of steam stations, super power steam station, and field of use.

### UNIT-II

**Hydro-electric Power Stations:** Hydrogen, hydro-graphs, flow duration curves, mass curves investigation of site, types of dams, arrangement and location of hydroelectric station, principles of working of a hydro-electro electric plants, power to be developed, size of plant and choice of units, type of turbines and their characteristics, draft tubes, penstock, power station structure and lay out, cost of hydro electric station (simple problems only).

#### UNIT-III

**Gas Turbine Stations:** Main parts of gas turbine plant and principles of operation, characteristics of gas turbine plants, plant lay out (simple problems only)

**Nuclear power Stations**: Main Parts, types of reactors, location and layout of nuclear power plant, reactor control, nuclear waste disposal, economics

### UNIT-IV

**Diesel Power Stations:** Principle of working of diesel engine, characteristics of diesel engines, dieselelectric generators and their characteristics, co-ordination of diesel engine and generator characteristics, layout of a diesel electric stations, cost of diesel plant, use of diesel sets as alternative power plant, field of use of diesel plants.

Advantages of combined working of different power stations need for co-ordination, co-ordination of different types of power plant in a power system (simple problems only)

#### UNIT-V

**Renewable Sources of Energy and Plants:** Need for renewable sources of energy and plants, energy supply options, Bio-gas plants and applications, Bio-mass plants and applications, solar electrical system and applications, Wind electrical systems and applications, Magneto Hydro Dynamic generation, MHD systems, Tidal power generation and tidal plants.

#### **Text Books:**

- 1. Power Plant Engineering by NAG, Tata Mc Graw-Hill.
- 2. Elements of Power Station Design by M.V.Deshpande, 3<sup>rd</sup> edition, Wheeler's Publication.
- 3. Electric Power Generation, Transmission and Distribution by S.N.Singh, Prentice-Hall of India

#### **EET07: CONTROL SYSTEMS**

Credits – 4 L: T: P::4: 0:0

#### UNIT-I

### INTRODUCTION

Introduction to control systems – Control theory concepts - Open loop and feedback control systems – Mathematics modelling of control systems – Analysis of control systems using Laplace transforms – Block diagram reduction techniques – Signal flow graphs. Controller components - types.

### UNIT –II

### TIME RESPONSE ANALYSIS

Time Response Analysis - Analysis of transient and steady state behaviour of control systems – Standard test signals – Time response of first order and higher order systems – Steady state errors – Error criterion.

#### UNIT- III

### **ROOT – LOCUS AND FREQUENCY RESPONSE ANALYSIS**

Root locus concepts - Construction of root loci – Root contours Time and frequency response correlation – Polar plot – Bode plot – All pass minimum phase and non-minimum phase systems– Gain margin – Phase margin.

#### UNIT- IV

#### SYSTEM STABILITY

Stability concepts – Conditions for stability – Routh, Hurwitz stability criteria – Relative stability analysis - Stability in frequency domain – Nyquist stability criterion – Relative stability analysis– Frequency response specification – Constant M circles – constant N circles – Nichol's chart. Compensation design of P, PI, PD & PID controllers.

#### UNIT –V

#### STATE SPACE ANALYSIS OF LINEAR CONTINUOUS SYSTEMS

Introduction - State space representation using physical variables – Phase variables and canonical variables – Derivation of transfer function from state model – Solving the time invariant state equation – State transition Matrix – Its properties and computation. Introduction to controllability and observability

#### **TEXT BOOKS:**

- 1. I.J.Nagrath and M.Gopal, "Control systems Engineering", 5th edition, New Age International (P) Limited, New Delhi, 2007.
- 2. K. Ogata, "Modern control engineering", pearson Education,4th edition,2004.

#### **REFERENCE BOOKS:**

- 1. Norman S. Nise,"Control System Engineering", 4th edition, Wiley Student Edition, 2008.
- 2. B.C.Kuo "Automatic control systems", 8th edition, Wiley Student Edition, 2008.
- 3. D.K.Cheng, Analysis of linear systems" Narosa Publishing House, New Delhi, 2002.

### **EET08: ELECTRICAL MEASUREMENTS**

Credits – 4 L: T: P::4: 0:0

#### UNIT – I

Accuracy – Precision – Types of errors – General theory of instruments. Deflecting, control, and damping torques in instruments – PMMC type of instrument – Extension of range – Ohmmeter – Multimeter – Megger. Moving iron, rectifier, and dynamometer type instruments.

#### UNIT – II

Circuits for D.C. measurements – Measurement of potential difference, current, and resistance – Wheatstone Bridge Carey-Foster Bridge – Kelvin's double bridge- Fundamentals of A.C. measurements – A.C. potentiometers.

#### UNIT – III

Principle of bridge measurements – Maxwell's Inductance Bridge, Maxwell's Inductance Capacitance Bridge, Hay's Bridge, Owen's Bridge, Anderson's Bridge, Desaunty's Bridge, Modified Desaunty's Bridge, Schering Bridge & Wein's Bridge - Potential and current transformers – Ratio and phase angle errors.

#### UNIT - IV

Measurement of power – Electro-dynamic instruments, Induction instruments. Measurement of energy – Single phase and three phase energy meters. Power factor meters, Synchroscopes, Ratiometers.

#### $\mathbf{UNIT}-\mathbf{V}$

Frequency meters- mechanical resonance type, electrical resonance type- Weston type frequency meters, Ratiometer type Frequency meter, Saturable core Frequency meter.

Magnetic measurements – Determination of H, B, B-H curve, Hysteresis loop – Permeameters – Iron loss tests at power frequencies.

### **TEXT BOOKS:**

- 1. Electrical and Electronics Measurements and Instrumentation by A.K.SHAWNEY
- 2. C.T.Baldwin, "Fundamentals of Electrical Measurements".
- 3. Helfric and Cooper, "Modern Electronic Instrumentation and Measurement Techniques".
- 4. John P.Bently, "Principles of Measurement Systems", 3<sup>rd</sup> edition.

### **ECT25: ANALOG AND DIGITAL IC APPLICATIONS**

Credits – 4 L: T: P::4: 0:0

#### UNIT-I

**INTEGRATED CIRCUITS :** classification, chip, size and circuit complexity, basic information of opamp, ideal and practical op-amp, internal circuits, op-amp characteristics, DC and AC characteristics, 741 op-amp and its features, modes of operation- inverting, non-inverting, differential.

**OP-AMP APPLICATIONS** : Basic application of op-amp, intrumentational amplifier, AC amplifier, V to I and I to V converters, sample and hold circuits, multipliers and dividers, differentiators and integrators, comparators, Schmitt trigger, Multivibrators, introduction to voltage regulators, features of 723.

### **UNIT-II**

**ACTIVE FILTERS & OSCILLATORS**: introduction, 1<sup>st</sup> order LPF, HPF filters. Band pass, Band reject and All Pass Filters. Oscillator types and principle of operation- RC, Wien and Quadrature type wave form generators- Triangular, Saw tooth, square wave and VCO.

**TIMERS**: introduction to 555 Timer, functional diagram, Monostable and Astable operations and applications, Schmitt trigger.

### UNIT-III

PHASE LOCKED LOOPS: Introduction, Block Schematic, principles and description

**D-A & A-D CONVERTERS**: Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R- 2R DAC and IC 1408 DAC, different types of ADCs-parallel comparator type ADC, counter type ADC, successive approximation ADC and Dual slope ADC, DAC & ADC specifications.

### UNIT-IV

Classification of integrated circuits, comparison of various logic families, standard TTL NAND Gate-Analysis & Characteristics, TTL open collector outputs, Tristate TTL, MOS & CMOS open drain and Tristate outputs, CMOs transmission gate, IC interfaci9ng- TTL driving CMOS & CMOS driving TTL. Design using TTL- 74XX & CMOS 40XX series, code converters, Decoders, Demultiplexers, Decoders & drives for LED & LCD display. Encoder priority encoder, Multiplexers & their applications, priority

& drives for LED & LCD display. Encoder, priority encoder, Multiplexers & their applications, priority generators, checker circuits. Digital arithmetic circuits- parallel Binary Adder/Subtractor circuits using 2's compliment system, Digital comparator circuits.

#### UNIT-V

**SEQUENTIAL CIRCUITS**: Flip-flops and their conversion, design of synchronous counters, Decade counters, shift registers and applications, Familiarities with commonly available 74XX & CMOS 40XX series of IC counters

**MEMORIES**: ROM Architecture, types & applications, RAM Architecture, static & dynamic RAMs, synchronous DRAMs.

### **TEXT BOOKS:**

- 1. Linear integrated circuits D. Roy Chowdhury, New Age International (p) Ltd, 2003.
- 2. Op-Amps & Linear Ics Ramakanth A. Gayakwad, PHI, 1987.

### **REFERENCES BOOKS:**

- 1. Operational Amplifiers & Linear integrated Circuits R.F. Coughlin & Fredrick F. Driscoll, PHI,
- 2. Operational Amplifiers & Linear integrated Circuits: Theory & Applications Denton J. Daibey, TMH.

Credits – 4 L: T: P::4: 0:0

# Sessional Marks: 30 University Exam Marks: 70

#### UNIT I

### SYNCHRONOUS GENERATORS

Principle And Constructional Features of Salient Pole and Round Rotor Machines – Armature Windings– Concentrated and Distributed Windings – Integral Slot and Fractional Slot Windings – Pitch, Distribution, Winding Factors – E.M.F Equation- Harmonics in Generated E.M.F – Elimination of Harmonics- Armature Reaction – Synchronous Reactance and Impedance – Load Characteristics - Phasor Diagram.

### UNIT II

### **REGULATION OF SYNCHRONOUS GENERATORS**

Regulation of Salient Pole Alternator – Voltage Regulation Methods – E.M.F Method – MMF Method – ZPF Method – ASA Method – Short Circuit Ratio (SCR) – Two Reaction Theory –Determination of  $X_d$  and  $X_q$  (Slip Test) – Phasor Diagrams.

#### UNIT III

### PARALLEL OPERATION OF SYNCHRONOUS GENERATORS

Power Flow Equation in Alternator (Cylindrical and Salient Pole Machine) – Synchronizing Power and Torque – Parallel Operation and Load Sharing – Effect of Change of Excitation and Mechanical Power Input – Synchronizing Alternators with Infinite Bus Bars - Determination of Sub-Transient, Transient and Steady State Reactance.

#### UNIT IV

#### SYNCHRONOUS MOTOR

Theory of Operation – Phasor Diagram – Power Flow Equations in Synchronous Motors- Variation of Current and Power Factor with Excitation – V and Inverted V Curves – Synchronous Condenser – Hunting and Methods to Eliminate Hunting – Starting Methods of Synchronous Motor.

#### UNIT V

#### SINGLE PHASE AND SPECIAL MOTORS

Single Phase Induction Motor - Constructional Features – Double Revolving Field Theory- Elementary Idea of Cross Field Theory – Split Phase Motors – Capacitor Start and Run Motors – Shaded Pole Motor. Principle and Performance of A.C Series Motor - Universal Motor – Single Phase Synchronous Motors – Reluctance Motor – Hysteresis Motor – Stepper Motor.

#### **TEXT BOOKS:**

1. Electrical Machinery Fundamentals, Stephen J Chapman, Mc Graw Hill, 4th Edition, 2005.

2. Electrical Machines – by P.S. Bimbhra, Khanna Publishers, 2011.

3. Electric Machines – by I.J. Nagarath & D.P.Kothari, Tata Mc Graw – Hill Publishers, 4th edition, 2010.

4. Electric Machinery – by A.E.Fitzgerald, C.Kingsley and S. Umans, Mc graw – Hill Companies, 5th edition, 1990.

#### **REFERENCES BOOKS:**

1. The Performance and design of A.C. Machines - by M.G. say, ELBS and pitman & sons, 1999.

- 2. Theory of Alternating Current Machinery by Langsdorf, Tata Mc graw Hill, 2nd edition, 2001.
- 3. Electromachanics III by S. Kamakashiah, Overseas publishers Pvt Ltd., 2005.
- 4. Electric Machines by M.S. Sarma and M.K. Pathak, CENGAGE learning, 2009

#### **EET10: POWER SYSTEMS-II**

#### UNIT-I

### PERFORMANCE OF TRANSMISSION LINES

**Representation of lines-Short transmission lines-Medium transmission lines-Nominal pie and T representation of long lines by distributed parameters-Equivalent T and Pie representation of long transmission lines - Evaluation of ABCD parameters of long lines-Ferranti effect-Power flow through a transmission line-Voltage control and line compensation-Introduction-Shunt capacitors-Series capacitors-Synchronous compensation, Receiving end power circle diagrams.** 

#### UNIT -II

### **VOLTAGE CONTROL**

Fundamental characteristics of excitation system; Block diagram model of exciter system; Generation and absorption of reactive power; methods of voltage control; static shunt capacitor/inductor VAR compensator; tap changing transformer; comparisons of different types of compensating equipment for transmission systems.

#### **UNIT-III**

#### **UNDER GROUND CABLES**

Introduction-The insulation types-Insulating materials for EHV voltage cables-Classification of cables -Parameters of single core cable-Grading of cables-Capacitance of three core belted cable break down of cables-Heating of cables –dielectric loss and Sheath losses-Current rating of cables.

#### UNIT-IV

#### POWER SYSTEM TRANSIENTS

Introduction-Circuit closing transients-Sudden symmetrical short circuit analysis of alternator-Recovery transient due to removal of a short circuit-Travelling waves on transmission line –Surge impedance and wave velocity-Specification of travelling waves-Reflections and refractions of waves-Different types of terminations-Forked line-Successive reflections- Beweleys Lattice diagram-Attenuation and Distortion-Arcing grounds

#### UNIT-V

#### **POWER SYSTEM EARTHING**

**Design of earthing grid- Tower Footing Resistance- Neutral earthing- Ungrounded and effectively earthed system-Resistance, Reactance, Arc suppression coil earthing and grounding transformers.** Extra high voltage transmission: Introduction-Need for EHV and UHV-Environmental aspects in EHV and UHV lines-Insulation requirements of EHV lines-Functions of static var systems in EHV transmission-Tuned power lines-EHV systems in India.

### **TEXT BOOKS:**

- 1. "Elements of power system analysis' by William D.Stevenson. Jr Mc GRAW-HILL International pub. 4<sup>th</sup> edition.
- 2. "Power system analysis and Design" by B.R.Gupta Wheelers publishing 3<sup>rd</sup> edition.
- 3. "Electrical power system" by C.L. Wadhwa newage publications.
- 4. "Power system analysis" by Arthur R.Bergen and Vijay Vittal, Pearson education, 2001.

### EEP02 - ELECTRICAL MACHINES-I LAB (III B.Tech SEM-I)

# Credits – 1 L: T: P::0: 0:2

### **List of Experiments**

- 1. Magnetising Characteristics Of Seperately Excited Dc Generator
- 2. Load Test On A Dc Compound Generator
- 3. Load Test On A Dc Shunt Generator
- 4. Hopkinson's Test On Dc Machines
- 5. Swinburne's Test On Dc Shunt Machine
- 6. Speed Control Of Dc Shunt Motor
- 7. Brake Test On Dc Shunt Motor
- 8. Seperation Of Losses Test

### ECP16 – ANALOG & DIITAL IC APPLICATIONS LAB (III B.Tech SEM-I)

# Credits – 1 L: T: P::0: 0:2

### **List of Experiments**

- 1. OPAMP applications
  - a) Adder and subtractor using inverting mode.
  - b) Adder and subtractor using Non-inverting mode.
  - c) Voltage Follower.
- 2. Integrator
- 3. Differentiator.
- 4. Active filter Applications-LPF, HPF (first order).
- 5. Monostable operation using 741IC.
- 6. Astable operation using 741IC.
- 7. VCO Application using 566IC.
- 8. Voltage Regulator using IC723.
- 9. 4 bit R-2R DAC using OPAMP.
- 10. OP AMP Comparator.

# **B.Tech**

# III YEAR II SEMESTER

S.NO	COURSE CODE	COURSE TITLE
1	BST10	Management Science
2	EET11	Switchgear & Protection
3	ECT09	Microprocessor &Interfacing
4	EET12	Power Electronics
5		ELECTIVE-I
6		ELECTIVE-II
7	EEP03	Electrical Measurements Lab
8	EEP04	Electrical Machines-II Lab

### **BST10: MANAGEMENT SCIENCE**

Credits – 4	Sessional Marks: 30
L: T: P::4: 0:0	University Exam Marks: 70

#### UNIT – I

### INTRODUCTION TO MANAGEMENT

Concept of Management and organization – Functions of Management - Evolution of Management Thought: Taylor's Scientific Management .Fayol's principles of Management Douglas Mc Gregor's theory X and Theory Y. Maslow's Hierarchy of human needs- Principles of Organization – Types of Organization

### **TYPES OF ORGANIZATIONAL STRUCTURE**

Line Organization, Functional Organization and Line and Staff Organization

#### UNIT – II

#### INTRODUCTION TO OPERATIONS MANAGEMENT

Plant location and Layout, Methods of Production. Work-study: Method Study-Procedure and charts. Work measurement – Procedure; time study, work sampling. Principles of Motion Economy. Materials Management: Objectives of inventory control. EOQ & ABC analysis

### UNIT-III

### INTRODUCTION TO HUMAN RESOURCE MANAGEMENT

The concept of HRM. Functions of the HR Manager. Manpower planning. Recruitment, Selection. Training and Development .Performance Appraisal, grievance handling and welfare administration .Job evaluation and merit ranking. **MARKETING**: Marketing Vs Selling, Marketing Mix, stages in Product Life Cycle ,Channels of Distribution.

#### UNIT-IV

#### NATURE AND IMPORTANCE OF ENTREPRENEURSHIP

Process of Entrepreneurship sickness of Entrepreneurs, Types of Entrepreneurship, Entrepreneur Vs Manager. Problems faced by women Entrepreneurs.

#### **BUSINESS PLAN**

Scope and Value of Business Plan, Resource and information needs and writing & development of a business plan.

#### UNIT-V

#### INTRODUCTION TO NETWORK ANALYSIS

PERT/CPM, Statistical Quality Control, X & R charts, P & C charts- Introduction to TQM & six sigma approach.

### **TEXT BOOKS:**

- 1. Koontz and O'Donnel, Principals of Management. McGrawHill,2001
- 2. Philip Kotler, Marketing, Management(11<sup>th</sup> Ed 2002) Prentice Hall of India.
- 3. Gary Dessler, Human Resource Management, Pearson Education Asis, 2002.

### **REFERENCE:**

- 1. L.S.Srinath .PERT/CPM.Affiliated East-West Press, New Delhi, 2002.
- 2. W.Glueck & L.R.Jauch, Business Policy and Strategic Management, McGraw Hill, 1986. A.R.Aryasri Management Science for JNTU(B.Tech).TMH, 2002
- 3. O.P.Khanna, Industrial Engineering & Management. Dhanpat Rai 1999

#### **EET11: SWITCH GEAR AND PROTECTION**

Credits – 4 L: T: P::4: 0:0

#### UNIT –I

Protection against over voltages: Causes of over voltages-over voltages due to lightning – Rod gaps-Horn gaps-Expulsion type and valve type lightning arresters-lightning arrester calculations-ground wirescounter poises-surge absorbers and surge diverters- surge protection of rotating machines

Insulation coordination: volt-time curve-basic impulse insulation levels of different equipment-insulation coordination of transformers & lightning arresters-insulation coordination of bus bars –transmission lines and other equipment in a power system.

#### UNIT – II

Circuit breakers: Arcs in air and oil – intiation of the arc-deionization of the arc-arc interruption theories, Restriking voltages ,Recovery voltages, and rate of rise of restriking voltages- Current chopping-Resistance switching

Classification of circuit breakers: Types of Oil circuit breakers- Air break circuit breaker -Air blast circuit breaker-- SF6 circuit breaker-Vaccum circuit breaker-High voltage D.C.Circuit breakers, Testing of circuit breakers-rating of circuit breakers- Selection of circuit breakers-auto reclosing methods .

Fuses – Introduction, Definitions, Fuse characteristics, Type of fuses, Application of HRC fuses, Discrimination.

#### UNIT -III

Protective Relays – Introduction – Need for protective systems in a power system –Zones of protection – Primary and backup protection – definition and functional characteristics of a protective relay – operating principles of electromagnetic relays - torque production in an induction relay – induction disc and induction cup structure relays – different types of overcurrent relays – time current characteristics and current setting of overcurrent relays – directional overcurrent relays – operating characteristics of a directional overcurrent relays.

### $\mathbf{UNIT} - \mathbf{IV}$

Distance relays: the universal torque equation – principle of distance protection – operating characteristics of impedance , reactance and mho relays- structures of reactance and mho relays – effects of arc resistance, type of fault, power swings and line lengths on the performance of distance relays – principles and operation of differential relays – construction and operating characteristics of simple and percentage differential relates – wire pilot, carrier current and micro wave pilot schemes of pilot relaying.

Static relays – Amplitude and phase comparators, Analysis of duality, Static amplitude comparators, integrating and instantaneous comparators, Static phase comparators. Coincidence type, Static overcurrent relays, Static directional relay, Static differential relay, Static distance relays, Impedance, Reactance & mho relays.

#### UNIT – V

System protection: Protective schemes for different types of feeders and transmission lines by over Current, distance and pilot relaying methods. Generator protection: Protection for stator faults, rotor faults and protection for abnormal conditions of a generator. Transformer protection: protection against short circuits by differential protection schemes –construction and working of Buchholz relay.

Bus bar protection schemes – frame leakage protection scheme.

#### **TEXT BOOKS:**

- 1. BadriRam & D.N.Vishwakarma Power system protection and switch gear., TMH publishing Company Ltd. 1995.
- 2. C.L.Wadhwa Electrical power systems, Wiley Eastern Ltd.
- 3. B.Ravindranath & M.Chander, power system protection & switch gear., Wiley Eastern Ltd.

#### ECT09: MICROPROCESSOR AND INTERFACING

Credits – 4	Sessional Marks: 30
L: T: P::4: 0:0	University Exam Marks: 70

UNIT – I

#### MICROPROCESSORS

Introduction to Microprocessor, development of microprocessors, 8086 microprocessor, - Architecture, Instruction set, Addressing modes, interrupt systems. System timing of 8086 – clock cycle, machine cycle and instruction cycle, timing diagram for simple instructions, generation of delays.

### UNIT – II

PROGRAMMING

Assembler, Assembler directives, Assembly language programs, (8086) with assembler directives for addition, subtraction, multiplication, division etc., sorting and searching, bit multiplication program using look-up tables, stages of software development, modular programming, debugging and documentation.

#### $\mathbf{UNIT}-\mathbf{III}$

### **DATA TRANSFER SCHEMES**

Synchronous, Asynchronous, Interrupt driven and DMA type schemes, USART (8251) and its interfacing, Programmable Interrupt controller (8259) and its interfacing, Programmable DMA controller and its interfacing, Data Communication standards RS - 232 Serial Interface standards, IEEE - 488 GPIB standard.

#### $\mathbf{UNIT} - \mathbf{IV}$

### **MEMORY INTERFACE TO 8086**

Interfacing various types of RAM and ROM chips, Address decoding techniques, Interfacing ADC and DAC to 8086 systems, Data acquisition, Waveform generation, Traffic light controller, stepper motor control, temperature measurement and control.

#### $\mathbf{UNIT} - \mathbf{V}$

#### ADVANCE MICROPROCESSOR

Introduction to 80386 and 80486 microprocessor, different modes of operation, protected mode, virtual mode.

Introduction to Pentium processor – special Pentium register, Pentium Memory management, Introduction to Pro-Microprocessor.

### **TEXT BOOKS :**

- 1. The Intel microprocessors by Barry B. Brey
- 2. Microprocessors and interfacing by douglas V. Hall
- 3. The intel microprocessors by Barry B. Brey & C.R. Sarm

### UNIT-I

Silicon controlled Rectifier – Static characteristics and ratings – turn-ON and turn-OFF mechanism – Gate characteristics – Series and parallel operation of SCR's, Need for Equalizing Network and Equalizing Network design – Protection circuits – Design of Snubber circuit – Class A,B,C,D,E types of commutation circuits.

Triac – construction details – Triggering mechanism – Phase control circuit –Applications. Introduction to GTO, LASCR, SUS, MOSIGT, IGBT.

#### **UNIT-II**

Phase controlled Rectifiers - Principles of phase control – Half-wave and full- wave controlled rectifiers with resistive, inductive and RLC load – Freewheeling diode operation – Bridge rectifiers – Single phase and three phase Rectifiers with inductive load – Half and fully controlled rectifiers – freewheeling diode operation – Effect of source inductance – Single quadrant, two quadrant and four quadrant operation of converters – Dual converter – circulation and non-circulating current mode of operation.

#### UNIT-III

Choppers – D.C Choppers – Principles of operation – control strategies, constant and variable frequency system, current limit control – Types of chopper circuits – Single Quadrant, Two Quadrant and Four Quadrant chopper circuits Morgan chopper Jone's chopper – step-up and multiphase chopper circuits.

#### UNIT-IV

Inverters – Classification – series and parallel inverters improved series inverters – Bridge inverters – Commutation circuits – current and voltage commutation circuits – single phase and three phase inverters – output waveform control –Mc Murray and Mc Murray -Bedford Inverter – Introduction to current source inverters.

#### UNIT-V

Cycloconverter – Principle of operation – single phase step-up and step down Cycloconverter – Threephase half-wave Cycloconverter – output voltage equation – circulating and non-circulating current mode of operation – Load commutated Cycloconverter.

Speed control – Speed control of DC motors using controlled rectifiers and choppers – Speed control of induction motors using inverters – slip power recovery scheme – Rotor Resistance ON-OFF control.

#### **TEXT BOOKS:**

1. Power Electronics - Dr.P.S.Bimbhra 2<sup>nd</sup> edition – Khanna publishers.

2. Power Electronics – M.D.SINGH and K.B.KHANCHANDANI – Tata Mc.Graw Hill publishers. **REFERENCES** 

- 1. Power Electronics Dr. Vedam Subramanyam.
- 2. Industrial and power Electronics RASHID.
- 3. A text book of Power Electronics S.N.SINGH.
### EEP03-ELECTRICAL MEASUREMENTS LAB (III B.Tech SEM-II)

## Credits – 1 L: T: P::0: 0:2

## List of Experiments

- 1. Calibration and Testing of single phase energy Meter.
- 2. Calibration of Dynamometer type low power factor meter.
- 3. Measurement of Current using Current Transformer.
- 4. Kelvin Double Bridge-Measurement of Low Resistance.
- 5. Measurement of Temperature using RTD.
- 6. Measurement of 3-Phase reactive power with single Wattmeter
- 7. Measurement of choke coil inductance using 3 Voltmeter and 3 Ammeter methods.
- 8. Relay Testing using secondary current injection set for over current.
- 9. Measurement of resistance by Wheatstone bridge.
- 10. Measurement of displacement using LVDT.

## EEP04-ELECTRICAL MACHINES-II LAB (III B.Tech SEM-II)

# Credits – 1 L: T: P::0: 0:2

## List of Experiments

- 1. Parallel Operation Of Single Phase Transformer
- 2. O.C & S.C Test On A  $1-\Phi$  Transformer
- 3. Sumpner's Test On A Pair Of Single Phase Transformer
- 4. Scott Connetion Of Transformers
- 5. Noload And Blocked Rotor Test On Three Phase Induction Motor
- 6. Load Test On Three Phase Squirrel Cage Induction Motor
- 7. No Load And Blocked Rotor Test On Singlephase Induction Motor
- 8. Emf Method Of A Three Phase Alternator
- 9. Zpf Method Of A Three Phase Alternator
- 10. Determination Of Xd And Xq Of A Salient Pole Machine
- 11. 'V' And Inverted 'V' Curves Of A Synchronous Motor
- 12. Fields Test On Dc Series Machine

# **B.Tech**

# **IV YEAR SEMESTER-I**

S.NO	COURSE CODE	COURSE TITLE
1	ECT27	Analog& Digital Communications
2	EET13	Power System Analysis
3	EET14	Power System Operation& Control
4	EET15	Power Semiconductor Drives
5		Elective-III
6		Elective-IV
7	EEP05	Power Electronics Lab
8	EEP06	Power System Simulation Lab

## ECT27: ANALOG AND DIGITAL COMMUNICATIONS

Credits – 4 L: T: P::4: 0:0

#### **COMMUNICATION PROCESS**

Sources of Information, Communication Channels, Modulation Process, and Communication Networks. **REPRESENTATION OF SIGNALS AND SYSTEMS** 

Signals and Sequences: Continuous Fourier Transform, Sampling Process, Discrete Fourier transform, Z-Transform, Convolution and Correlation, Discrete time filtering.

## UNIT- II

#### INTRODUCTION TO STOCHASTIC PROCESSES

Probability theory, Random Processes, Power Spectral density, Gaussian Process, and Noise.

#### UNIT-III

## **CONTINUOUS WAVE MODULATION**

Amplitude and Frequency Modulation, Frequency Division Multiplexing, Noise in continuous wave modulation, Pulse Modulation – Pulse, Amplitude Modulation, Pulse Code Modulation, Time Division Multiplexing.

#### UNIT- IV

#### **BASEBAND TRANSMISSION**

Matched filter, Error Rate due to noise, Inter Symbol Interference, Baseband M-ary PAM transmission, Digital subscriber lines.

#### PASS BAND TRANSMISSION

Frequency Shift Keying, Phase Shift Keying

#### UNIT- V

#### **INFORMATION THEORY**

Uncertainty, Information, Entropy, Source coding theorem, Mutual information, channel capacity theorem, channel coding theorem, Information capacity theorem, Rate-distortion theory, and Data compression.

## ERROR CONTROL CODING

Linear block codes, cyclic codes, Convolution codes, Turbo Codes.

#### **TEXT BOOKS:**

- 1. Simon Haykin, Communication Systems, 4<sup>th</sup> edition, John Wiley & sons. Inc (2001).
- 2. Simon Haykin and Barry Van Veen, Signals and Systems, John Wiley & Sons 1998.

Sessional Marks: 30 University Exam Marks: 70

#### UNIT- I

## UNIT-I

**Fault studies:** Per unit system, Introduction to symmetrical fault analysis-Short circuit capacity of a bus-The short circuit currents and the reactance of synchronous machines-Internal voltages of loaded machines under transient conditions-Expressions for fault MVA interns of per unit and percentage quantities-Need for current limiting reactors and their location-The selection of circuit breakers.

#### UNIT-II

**Introduction to unsymmetrical faults**-Symmetrical components- phase shift of symmetrical components in Star-Delta transformer banks-Power in terms of symmetrical components-Unsymmetrical series impedances- sequence impedances and sequence networks-Sequence Networks of unloaded generators-Sequence impedances of transmission lines-Sequence impedances of transformers - Zero sequence networks of 3 phase loads and 3 phase transformer banks-Unsymmetrical fault analysis on unloaded generator and on power systems with and without fault impedances.

#### **UNIT-III**

**Load flow studies:** Need for load flow studies in a power system-Incidence matrix -Formation of Bus admittance matrix by direct and singular transformation methods- -Classification of types of buses in a power system-Formulation of load flow equations-Gauss-Seidel, iterative method for load flow studies-Treatment of PV bus-Acceleration factors-Newton Raphson method for load flow solution with rectangular and polar coordinates- formulation of load flow equations-Decoupled and fast decoupled load flow

#### **UNIT-IV**

**Stability studies:** Classification of stability studies-The power flow equations of round rotor and salient pole synchronous machine connected to infinite bus through a transmission system under steady state and transient state - Power flow equations of a two machine system - Power flow equations in terms of ABCD constants-Power angle diagrams-Derivation of swing equation, Inertia constant. steady state stability analysis: Steady state stability and steady state stability limits.

#### UNIT-V

**Transient stability analysis:** General considerations and assumptions-Transient stability and stability limits-Reduction of two finite machine system to one machine system-Solution of swing equation of one machine system by point by point method-Digital solution by numerical methods-Equal area criterion-Limitations of equal area criterion- Determination of critical clearing angle. Methods for improving power system stability.

#### **Text Books:**

- 1. "Elements of power system analysis ", 4 ed, William .D. Stevenson Jr., MGH International.
- 2. "Electrical power systems" by C.L. Wadhwa , New Age International publications.
- 3. "Power system analysis" by Hadi Saadat ,MGH International.
- 4. "Power system analysis" by AR Bergen and Vijay Vittal, Pearson education Asia, 2001.

#### **OPTIMAL LOAD FLOW**

Incremental cost curve, co-ordination equations with losses neglected - solution by iteration; coordination equations with loss included (No derivation of Bmn co-efficient); solution of co-ordination equations using Bmn co-efficient by iteration method., Base point and participation factors; Economic dispatch controller added to LFC.

**UNIT II** 

#### **ACTIVE POWER CONTROL**

Power control mechanism of individual machine; mathematical model of speed governing mechanism, speed load characteristics of governing mechanism; Regulation of two generators in parallel; Division of power system into control areas; LFC control of a single area; static and dynamic analysis of uncontrolled system; proportional plus integral control of a single area; LFC control of two area system - uncontrolled case, static and dynamic response; Tie line with frequency bias control of two area.

#### **UNIT III**

## LOAD FORECAST AND UNIT COMMITMENT

Load and load duration curves; Load forecasting, components of system load, classification of base load, forecasting of the base load by method of least square fit; Introduction to unit commitments constraints on unit commitment, unit commitment using priority ordering load dispatching and dynamic programming method.

#### UNIT IV

#### **VOLTAGE STABILITY AND REACTIVE POWER CONTROL**

voltage stability problems in a power system – over flow of reactive power control – control of reactive power flow on a line – load compensation – specification of load compensator – uncompensated and compensated transmission lines.

#### UNIT V

#### SECURITY CONCEPTS

Power system security; Factors affecting system security; Different operating states of power systems; energy control centers and its functions; Necessity for regulation of system frequency and voltage; Power systems control problems; P - F and Q - V control structure; SCADA systems.

#### **TEXT BOOKS**

1. D.P.Kothari and I.J.Nagrath, " Modern Power System Analysis" Tata Mc Graw Hill publishing company Ltd., 2003.

2. Prabha Kundur, "Power System Stability and Control" Tata Mc Graw Hill publishing company Ltd., 2006

#### **REFERENCE BOOKS**

1. Olle I. Elgerad, "Electric Energy System Theory and Introduction", Tata Mc Graw Hill publishing company, New

Delhi, 2nd edition, 2004.

2. Allen J.Wood, Bruce F. Wollenbarg, "Power Generation, operation and control", 2<sup>nd</sup> edition, John Wiley and

sons, 2008.

3. P.S.R. Murty, "Operation and Control in Power Systems" BS Publications, 2005.

#### UNIT I

#### **EET15: POWER SEMICONDUCTOR DRIVES**

# Credits – 4 L: T: P::4: 0:0

## Sessional Marks: 30 University Exam Marks: 70

## UNIT-I

**Electrical Drives** An introduction – Electrical Drives, Advantages of Electrical Drives, parts of electrical drives – Electrical motor, power modulators, sources, control unit, choice of electrical drives, status of dc and ac drives.

# **Dynamics of Electrical Drives**

Fundamental Torque equations, speed torque characteristics and multi quadrant operation, Equivalent values of drive parameters – Loads with rotational motion, loads with translational motion, measurement of moment of inertia. Components of load torques, Nature and classification of load torques, calculation of time and energy loss in transient operation, steady state stability, load equalization.

## UNIT-II

## **Control of Electrical Drives**

Modes of operation, speed control and drive classifications closed loop control of drives. D.C Motor drives – Starting, Braking, speed control - Armature voltage control, Ward Leonard drives.

## UNIT-III

Controlled rectifier fed DC drives – Single phase and 3-phase fully controlled and half controlled converter fed separately excited DC motor, chopper – Controlled DC drives.(separately excited motor)

## UNIT-IV

## **Induction Motor Drives**

Speed control – Pole changing, Stator voltage control – AC voltage controllers, variable frequency and variable voltage control from inverter. Different types of braking – Dynamic, regenerative and plugging.

## UNIT-V

## **Energy Conservation in Electrical Drives**

Losses in electrical drive system, measures of energy conservation in electrical drives, use of efficient converters, energy efficient operation of drives, improvement of p.f., improvement of quality of supply, maintenance of motors.

## **Synchronous Motor Drives**

Need for leading pf operation—open loop VSI fed drive and its characteristics—Control Techniques — brushless excitation system.

## **TEXT BOOKS:**

- 1. G.K.Dubey Fundamentals of Electrical drives.
- 2. Vedam Subrahmanyam Electrical drives Concepts and applications.

#### **EEP05- POWER ELECTRONICSLAB**

#### LIST OF EXPERIMENTS

- 1. Characteristics of SCR, MOSFET&IGBT.
- 2. GATE FIRING CIRCUITS OF SCR's.
- 3. Single phase AC voltage controller with R and RL loads.
- 4. Single phase fully controlled Bridge converter with Rand RL loads.
- 5. DC Jones Chopper with R and RL loads.
- 6. Single phase Cycloconverter with R and RL loads.
- 7. Single phase half controlled Bridge converter with R and RL loads.
- 8. Single phase series inverter with R and RL loads.
- 9. Forced commutation circuits.
- 10. Single phase parallel inverter with R and RL loads

## **EEP06- POWER SYSTEM SIMULATION LAB**

## LIST OF EXPERIMENTS

- 1. Root Locus
- 2. Bode Plot
- 3. Nyquist Plot
- 4. Y-Bus system using Singular Transformation
- 5. Step Response with out and with derivative control
- 6. Transfer Function
- 7. Resonance Frequency
- 8. Overall Transfer Function
- 9. Gauss Seidel Method
- 10. Runge-Kutta Method

# **B.Tech**

#### **IV YEAR SEMESTER-II**

S.NO	COURSE CODE	COURSE TITLE
1	EET16	Utilization of Electrical Energy
2		Elective-V
3		Elective-VI
4	EEP07	Project Work

## **EET16: UTILIZATION OF ELECTRICAL ENERGY**

## Credits – 4 L: T: P::4: 0:0

#### ILLUMINATION

Definition –Laws of Illumination–Polar Curves – Calculation of MHCP and MSCP. Lamps: Incandescent Lamp, Sodium Vapour Lamp, Fluorescent Lamp. Requirement of Good Lighting Scheme – Types, Design and Calculation of Illumination, CFL, LED lamps, Street Lighting and Factory Lighting–Numerical Problems.

## UNIT II

### **ELECTRIC HEATING & WELDING**

Electrical Heating: Advantages. Methods of Electric Heating – Resistance, Induction and Dielectric Heating.

Electric Welding: Types – Resistance, Electric Arc, Gas Welding. Electrodes of Various Metals, Defects in Welding. Electrolysis - Faraday's Laws, Applications of Electrolysis, Power Supply for Electrolysis.

#### UNIT III

## **ELECTRIC TRACTION-I**

Introduction – Systems of Electric Traction. Comparison Between A. C And D. C Traction – Special Features of Traction Motors - The Locomotive – Wheel arrangement and Riding Qualities – Transmission of Drive – Characteristics and Control of Locomotives and Motor Coaches for Track Electrification – DC Equipment – AC Equipment – Electric Breaking with DC Motors and with AC Motors – Control Gear – Auxiliary Equipment – Track Equipment and Collector Gear – Conductor-Rail Equipment – Overhead Equipment – Calculation of Sags and Tensions – Collector Gear for Overhead Equipment.

## UNIT IV

## **ELECTRIC TRACTION - II**

Mechanics of Train Movement. Speed-Time Curves of Different Services – Trapezoidal and Quadrilateral, Speed-Time Curves – Numerical Problems. Calculations of Tractive Effort, Power, and Specific Energy Consumption - Effect of Varying Acceleration and Braking Retardation, Adhesive Weight and Coefficient of Adhesion – Problems.

#### UNIT V

#### ECONOMIC ASPECTS OF UTILISING ELECTRICAL ENERGY

Power Factor Improvement, Improvement of Load Factor, Off Peak Loads- Use of Exhaust Steam, Heat Stations, Pit Head Generation, Diesel Plant, General Comparison of Private Plant and Public Supply-Initial Cost and Efficiency, Capitalization of Losses, Choice of Voltage, Cost of Renewals.

#### **TEXT BOOKS:**

1. Utilization of Electric Energy - by E. Openshaw Taylor and V. V. L. Rao, Universities Press, 2009.

2. Art & Science of Utilization of electrical Energy – by Partab, Dhanpat Rai & Co., 2004.

#### **REFERENCE BOOKS:**

1. Generation, distribution and utilization of electrical energy by C.L Wadhwa, Wiley Eastern Limited, 1993

2. "Electrical Power", by S. L. Uppal, Khanna pulishers, 1988.

## UNIT I

## **ELECTIVE COURSES**

# **ELECTIVE-I**

S.No	Course Code	Course Title
1	EET19	Renewable Energy Sources
2	ECT44	Electronic Instrumentation
3	EET20	Modern Control Theory
4	EET21	Energy Audit and Demand Side Management
5	CSP13	Advanced Programming Lab

#### **EET19: RENEWABLE ENERGY SOURCES**

### (ELECTIVE-I)

## Credits – 3 L: T: P::4: 0:0

## UNIT-I

**Introduction to Energy Sources** 

Energy sources and their availability, Non-renewable reserves and resources; renewable resources, Transformation of Energy, Energy scenario in India.

#### UNIT II

## Solar energy

Basic characteristics of sunlight – solar energy resource – Solar processes and spectral composition of solar radiation; Radiation flux at the Earth's surface. Solar collectors, Types and performance characteristics.

#### UNIT III

#### Solar energy storage

Solar energy storage systems and Solar pond.

## **Applications of Solar energy**

Photovoltaic cell-characteristics - equivalent circuit- Photovoltaic effect - photo voltaic for battery charging-applications.

#### **UNIT-IV**

#### **Biomass Energy Systems**

Biomass sources-production processes- Gasification, Anaerobic Digestion, Pyrolysis, Biogas-Performance analysis and testing

#### **UNIT-V**

#### Wind energy

Wind Distribution – principles of wind energy conversion –basic components of wind energy conversionadvantages and disadvantages- Principles of Operation of wind turbines, types of wind turbines and characteristics, Generators for Wind Turbines, Control strategies.

## **TEXT BOOKS:**

1. G.D.Rai "Non Conventional Energy sources", Khanna Publishers, Newdelhi, 1999.

2. G.N.Tiwari and M.K.Ghosal, "Renewable energy resources, Basic Principles and applications", Narosa Publishing house, Newdelhi.

3. S.N.Badra, D.Kastha and S.Banerjee "Wind electrical Systems", Oxford university press, Newdelhi.

4. M.V.R.koteswara Rao "Energy resources Conventional & Non conventional" BS publications-Hyderabad, 2004.

5. Gilbert M.Masters "Renewable and Efficient electric power systems" Wiley interscience Publications, 2004.

Sessional Marks: 30 University Exam Marks: 70

#### ECT44: ELECRONIC INSTRUMENTATION (ELECTIVE-I)

Credits – 3 L: T: P::4: 0:0 Sessional Marks: 30 University Exam Marks: 70

### UNIT-I

Cathode Ray Oscilloscopes : Motion of electron in electric field and in magnetic field – Block diagram of CRO, CRT, Electrostatic deflection sensitivity – Vertical and Horizontal deflection systems – Principle of operation of dual beam, dual trace, sampling and storage CROs – Measurements with CRO (voltage, current, time, frequency, phase angle, Lissajous figures).

#### UNIT-II

Digital instruments – Digital voltmeters(Ramp, Dual slope, stair case, successive approximation types) Digital multimeter, universal counter, Digital tachometer, Digital phase meter IEEE 488 Bus.

#### **UNIT-III**

Analog Instruments – Transistor voltmeter, micro voltmeter (chopper type) - DC differential voltmeter - AC voltmeters - Multimeter - Q meter and measurement methods – Wave analyzers(AF & RF) - Harmonic distortion analyzers – Spectrum analyzer.

#### UNIT-IV

Transducers – Classification and selection of transducers – strain gauges – Temperature measurement (resistance thermometer, thermo couples and thermisters) LVDT – Peizo electric transducer.

#### UNIT-V

Recorders and Printers – Strip chart recorders (Galvanometer type, null type) X-Y Recorders – Classification of printers – Line printers, dot-matrix printer, Inkjet and laser printers.

#### **TEXT BOOKS:**

- 1. H.S.Kalsi, "Electronic Instrumentation" TMH, 1995.
- 2. Helfric and Cooper, "Modern Electronic Instrumentation and measurement techniques", PHI, 1995.

#### EET20: MODERN CONTROL THEORY (ELECTIVE-I)

Credits – 3 L: T: P::4: 0:0

## Sessional Marks: 30 University Exam Marks: 70

#### UNIT I

## CONTROLLABILITY AND OBSERVABILITY

Review of State Space Analysis, Tests for Controllability and Observability for Continuous Time Systems – Principle of Duality, Controllability and Observability of State Models in Jordan Canonical Form and Other Canonical Forms. Effect of State Feedback on Controllability and Observability.

#### UNIT II

## ANALYSIS OF NONLINEAR SYSTEMS

Introduction to Nonlinear Systems, Types of Nonlinearities, Concepts of Describing Functions, Derivation of Describing Functions for Dead Zone, Saturation, Backlash, Relay With Dead Zone and Hysteresis - Jump Resonance. Introduction to Phase-Plane Analysis, Method of Isoclines for Constructing Trajectories, Singular Points, Phase-Plane Analysis of Nonlinear Control Systems.

#### UNIT III

#### STABILITY ANALYSIS

Stability in the Sense of Lyapunov. Lyapunov's Stability and Lyapunov's Instability Theorems. Direct Method of Lyapunov for the Linear and Nonlinear Continuous Time Autonomous Systems.

#### UNIT IV

#### CONTROLLERS AND OBSERVERS DESIGN

Design of State Feedback Control through Pole Placement. Full Order Observer and Reduced Order Observer. State Estimation through Kalman Filters.

#### UNIT V

#### **OPTIMAL CONTROL**

Introduction to Optimal Control, Formulation of Optimal Control Problems, Calculus of Variations, Minimization of Functionals of Single Function, Euler Lagrange Equation, Constrained Minimization, Minimum Principle, Control Variable Inequality Constraints, Control and State Variable Inequality Constraints.

#### **Text Books:**

1. Modern Control System Theory – by M. Gopal, New Age International Publishers, 2nd edition, 1996.

2. Systems and Control by Stainslaw H. Zak, Oxford Press, 2003.

#### **Reference Books:**

1. Modern Control Engineering – by K. Ogata, Prentice Hall of India, 3rd edition, 1998.

2. Control Systems Engineering by I.J. Nagrath and M.Gopal, New Age International (P) Ltd. 2007.

3. Digital Control and State Variable Methods – by M. Gopal, Tata Mc Graw-Hill Companies, 1997.

#### EET21: ENERGY AUDITING & DEMAND SIDE MANAGEMENT (ELECTIVE-I)

Credits – 3 L: T: P::4: 0:0

# **ENERGY AUDITING**

Energy Situation – World and India, Energy Consumption, Conservation, Codes, Standards and Legislation. Energy Audit- Definitions, Concept, Types of Audit, Energy Index, Cost Index, Pie Charts, Sankey Diagrams, Load Profiles, Energy Conservation Schemes. Measurements in Energy Audits, Presentation of Energy Audit Results.

#### UNIT II

#### **ENERGY EFFICIENT MOTORS**

Energy Efficient Motors, Factors Affecting Efficiency, Loss Distribution, Constructional Details, Characteristics - Variable Speed, Variable Duty Cycle Systems, RMS Hp- Voltage Variation-Voltage Unbalance- Over Motoring- Motor Energy Audit.

## UNIT III

## POWER FACTOR IMPROVEMENT

Power Factor – Methods of Improvement, Location of Capacitors, Power Factor with Non Linear Loads, Effect of Harmonics on Power Factor and Power Factor Motor Controllers.

#### UNIT IV

## LIGHTING AND ENERGY INSTRUMENTS

Good Lighting System Design and Practice, Lighting Control ,Lighting Energy Audit – Energy Instruments- Watt Meter, Data Loggers, Thermocouples, Pyrometers, Lux Meters, Tongue Testers ,Application of PLC's

#### UNIT V

## ENERGY ECONOMIC ANALYSIS & DEMAND SIDE MANAGEMENT

The Time Value of Money Concept, Developing Cash Flow Models, Payback Analysis, Depreciation, Taxes and Tax Credit – Numerical Problems. Introduction to DSM, Concept of DSM, Benefits of DSM, Different Techniques of DSM – Time of Day Pricing, Multi-Utility Power Exchange Model, Time of Day Models for Planning. Load Management, Load Priority Technique, Peak Clipping, Peak Shifting, Valley Filling, Strategic Conservation, Energy Efficient Equipment. Management and Organization of Energy Conservation Awareness Programs.

#### **Text Books:**

1. Industrial Energy Management Systems, Arry C. White, Philip S. Schmidt, David R. Brown, Hemisphere Publishing Corporation, New York, 1994.

2. Fundamentals of Energy Engineering - Albert Thumann, Prentice Hall Inc, Englewood Cliffs, New Jersey, 1984.

3. Electrical Power distribution, A S. Pabla, TMH, 5th edition, 2004

4. Demand Side Management, Jyothi Prakash, TMH Publishers, 2004.

## **Reference Books:**

- 1. Energy management by W.R. Murphy & G. Mckay Butter worth, Heinemann publications, 2007.
- 2. Energy management by Paul o" Callaghan, Mc-graw Hill Book company-1st edition, 1998
- 3. Energy efficient electric motors by John .C. Andreas, Marcel Dekker Inc Ltd-2nd edition, 1995.

4. Energy management hand book by W.C.Turner, John wiley and sons, 1986.

5. Energy management and good lighting practice : fuel efficiency- booklet12-EEO, 1993.

6. Recent Advances in Control and Management of Energy Systems, D.P.Sen, K.R.Padiyar, Indrane Sen,

M.A.Pai, Interline Publisher, Bangalore, 1993.

- 7. Energy Demand Analysis, Management and Conservation, Ashok V. Desai, Wiley Eastern, 2005.
- 8. Hand book on energy auditing TERI (Tata Energy Research Institute), 1999.

## Sessional Marks: 30 University Exam Marks: 70

## UNIT I

# **ELECTIVE-II**

S.No	Course Code	Course Title
1	ECT15	VLSI Design
2	ECT10	Digital Signal Processing
3	CST48	Fundamentals of Database Systems
4	EET22	Power Quality
5	MUP01	Music(OPEN ELECTIVE)
6	MUP02	Dance-Bharatanatyam(OPEN ELECTIVE)
7	MUP03	Dance-Kuchipudi(OPEN ELECTIVE)

## ECT15: VLSI DESIGN (ELECTIVE-II)

Credits – 3 L: T: P::4: 0:0

## Sessional Marks: 30 University Exam Marks: 70

# UNIT – I

## Fundamentals of IC Fabrication Processes

Preparation of EGS, Crystal growing, Water preparation, Epitaxy, Oxidation, Photolithography, Diffusion, Metallization, CMOS fabrication, p-well process, n-well process, twin-tub process, Bi-CMOS fabrication, IC design techniques, Hierarchical design and Design abstraction.

#### UNIT – II

## **Devices and Layout**

Sheet resistance, Area capacitance, Delay Unit, MOS transistor, Structure of the transistor, Simple transistor model, Transistor parasitic, Wires and Vias. Tub ties and latch up, Wire parasitic, Advance characteristics, Design rules, Fabrication errors, Scalable design rules, SCOMS design rules, Layout design and tools, Layout for circuits, Stick diagrams, Hierarchical stick diagrams.

#### UNIT – III

#### **Gates, Network and Sequential Machines**

Static complementary gates, Gate structures, Basic gate layout, Delay, Power consumption, Speed-power product, Parasitics, Wires and delay, Network delay, Fan-out, Path delay, Transistor sizing, Sequential machines, Latches and Flip-Flops.

#### UNIT - IV

#### Subsystems and Design Approach

Subsystems, pipelining, Data paths, Circuit design: PLA, FPGAs, CPLDs, VHDL synthesis, Circuit design flow, Circuit synthesis, simulation, layout, design capture tolls, design verification tolls, test principles.

#### UNIT - V

## **Testing and Testability**

System partitioning, Design for testability, Brief study of Fault models, ATPG, Testing combinational logic, Testing sequential logic, Scan design techniques BIST.

## **Text Books:**

- 1. S.M. Sze, "VLSI Technology" Mc Graw Hill. Int. Edn (UNIT I).
- 2. Wayne wolf, "Modern VLSI Design", Pearson Education Asia (II to IV).
- 3. Dougles A. Pucnell and Karmaran Eshraghian, "Basic VLSI Design". Prentice Hall of India Private Limited (Unit V).
- 4. Introduction to VLSI design Eugine D. Fabricus, Mc Graw Hill

#### **ECT10: DIGITAL SIGNAL PROCESSING**

(ELECTIVE-II)

Credits – 3 L: T: P::4: 0:0

## Sessional Marks: 30 University Exam Marks: 70

## UNIT – I

## **DISCRETE FOURIER TRANSFORMS:**

Introduction, Computation of DFT, Properties of DFT, introduction to Fourier series, DTFT, The Goertzal Algorithm, Decimation in Time Fast Fourier Transform (FFT) Algorithm, Inverse DFT using FFT algorithm, Decimation in Frequency FFT Algorithms, Circular convolution.

## UNIT – II

## STRUCTURES FOR DISCRETE TIME SYSTEMS:

Introduction, Block Diagram representation of linear constant coefficient difference equations, Signal flow graph representation of linear constant coefficient difference equations. **BASIC STRUCTURES FOR IIR SYSTEMS: Direct** forms, Cascade forms, Parallel forms, Lattice Structures, Transposed forms. **IIR DIGITAL FILTERS :**Design of Discrete time IIR Filters from Continuous Time Filters, Design by Impulse Invariance, Bilinear Transformation, Examples of Bilinear Transformation design, Butterworth filter, Butter worth approximation, Chebyshev approximation.

#### UNIT – III

**Basic Network systems for FIR Systems**: Direct forms, Cascade forms, Structures for Linear Phase FIR Systems **FIR DIGITAL FILTERS: Design** of FIR from Windowing, Properties of Rectangular, Bartlet, Hamming Windows, Keiser Window Filter design methods, Comparison of IIR & FIR Filters. FIR filters design by frequency sampling method.

#### **UNIT IV**

**MULTIRATE DIGITAL SIGNAL PROCESSING :**The basic sample rate, Decimation and Interpolation, Multirate structures for sampling rate conversion, Multistage design of decimator and interpolator, the polyphase decomposition, Arbitrary rate. Sampling rate converter, Nyquiest Filters.

#### UNIT - V

**DIGITAL SIGNAL PROCESSORS:** Introduction to Programmable DSP's, Multiplier and Multiplier accumulator (MAC), Modified bus structures and Memory Acess Schemes in P-DSP's Multiplier Access Memory, Multiported Memory, VLIW Architecture, Pipelining, Special addressing modes in PDSPs, Onchip Perpherals. **FEATURES OF TMS3210C5X PROCESSORS:** Internal Architecture, External Memory accessories, Pipeline operations, Peripherals.

#### **TEXT BOOKS:**

- 1. Digital Signal Processors by Venkataramani & Bhaskar, Tata Mc Graw-Hill, 2002.
- 2. Digital Signal Processing by Sanjit K Mitra, 2<sup>nd</sup> Edition, Tata Mc Graw-Hill, 2011.
- 3. Digital Signal Processing by Oppernheim, Scheafer and Buck, Prentice-Hall, 1989.

## CST48: FUNDAMENTALS OF DATABASE MANAGEMENT SYSTEM (ELECTIVE-II)

Credits – 3 L: T: P::4: 0:0 Sessional Marks: 30 University Exam Marks: 70

## UNIT – I:

**INTRODUCTION**: Database system, Characteristics (Database Vs File System), Database Users, Advantages of Data base systems, Database applications. Data Models; Concepts of Schema, Instance and data independence; Three tier schema architecture for data independence; Database system structure, environment, Centralized and Client Server architecture for the database.

### UNIT – II:

**RELATIONAL MODEL** : Introduction to relational model, concepts of domain, attribute, tuple, relation, importance of null values, constraints (Domain, Key constraints, integrity constraints) and their importance **BASIC SQL** : Simple Database schema, data types, table definitions (create, alter), different DML operations (insert, delete, update), basic SQL querying (select and project) using where clause, arithmetic & logical operations, SQL functions(Date and Time, Numeric, String conversion).

#### UNIT – III:

**Entity Relationship Model**: Introduction, Representation of entities, attributes, entity set, relationship, relationship set, constraints, sub classes, super class, inheritance, specialization, generalization using ER Diagrams. **SQL**: Creating tables with relationship, implementation of key and integrity constraints, nested queries, sub queries, grouping, aggregation, ordering, implementation of different types of joins, view(updatable and non-updatable), relational set operations.

**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), Lossless join and dependency preserving decomposition, Fourth normal form(4NF).

## UNIT – IV:

**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, inconsistent retrievals and the Scheduler. **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,

## UNIT-V:

**Database Recovery management** : Transaction recovery. SQL constructs that grant access or revoke access from user or user groups. **Distributed Databases:** Structure of Distributed databases, Trade-off in distributing the database, Design of distributed databases, Security and Integrity, Violations, Authorizations& views, security in SQL, Encryption.

Basic PL/SQL : Introduction, Triggers. Procedures, functions.

## **Text Book:**

1. Database Management Systems by Raghu Rama krishna, JhonnansGherke TMH,3rd edition, 2003.

2.Database concepts by A.silbertschatz, H.F.Korth, s.sudarshan, MCgraw Hill, VI Edition 2006.

## **References:**

1.C.J.Date"An introduction to database systems",6 th edition Addison Wesley.

2.ElmaasriNavathe, "Fundamentals of database managemntSystems", Addisonwelesy 2nd edition.

**EET22: POWER QUALITY** (ELECTIVE-II)

**INTRODUCTION** 

## **Sessional Marks: 30 University Exam Marks: 70**

## UNIT I

Definition of Power Quality- Power Quality Terminology - Classification of Power Quality Issues-Magnitude Versus Duration Plot - Power Quality Standards - Responsibilities of The Suppliers and Users of Electric Power-CBEMA and ITIC Curves.

#### **UNIT II**

#### TRANSIENTS, SHORT DUARION AND LONG DURATION VARIATIONS

Categories and Characteristics of Electromagnetic Phenomena in Power Systems-Impulsive and Oscillatory Transients-Interruption - Sag-Swell-Sustained Interruption - Under Voltage - Over Voltage-Outage. Sources of Different Power Quality Disturbances- Principles of Regulating the Voltage-Conventional Devices for Voltage Regulation.

#### **UNIT III**

#### **FUNDAMENTALS OF HARMONICS & APPLIED HARMONICS**

Harmonic Distortion, Voltage Versus Current Distortion, Harmonics Versus Transients, Power System Qualities Under Non Sinusoidal Conditions, Harmonic Indices, Harmonic Sources From Commercial Loads, Harmonic Sources From Industrial Loads. Applied Harmonics: Effects Of Harmonics, Harmonic Distortion Evaluations, Principles of Controlling Harmonics, Devices for Controlling Harmonic Distortion.

#### **UNIT IV**

## POWER OUALITY MONITORING

Power Quality Benchmarking-Monitoring Considerations- Choosing Monitoring Locations- Permanent Power Quality Monitoring Equipment-Historical Perspective of Power Quality Measuring Instruments-Power Quality Measurement Equipment-Types of Instruments- Assessment of Power Quality Measurement Data- Power Quality Monitoring Standards.

#### **UNIT V**

#### POWER QUALITY ENHANCEMENT USING CUSTOM POWER DEVICES

Introduction to Custom Power Devices-Network Reconfiguring Type: Solid State Current Limiter (SSCL) -Solid State Breaker (SSB) -Solid State Transfer Switch (SSTS) - Compensating Type: Dynamic Voltage Restorer (DVR)-Unified Power Quality Conditioner(UPQC)-Principle of Operation Only.

## **Text Books:**

1. Electrical Power Systems Quality, Roger C. Dugan, Mark F. McGranaghan, Surva Santoso, H.Wayne Beaty, 2nd Edition, TMH Education Pvt. Ltd., 2008.

2. Power quality by C. Sankaran, CRC Press, 2002.

#### **Reference Books:**

1. Understanding Power quality problems by Math H. J. Bollen IEEE Press, 2007.

Power quality enhancement using custom power devices by Arindam Ghosh, Gerard 2. Ledwich, Kluweracademic publishers, 2002.

## **ELECTIVE-III**

S.No	Course Code	Course Title
1	EET23	Neural Network & Fuzzy Logic
2	EET24	Switch Mode Power Converters
3	ECT34	Satellite Communication
4	EET25	Smart Electrical Grids

EET23: NEURAL NETWORKS AND FUZZY LOGIC

(ELECTIVE-III)

Credits – 3 L: T: P::4: 0:0

## Sessional Marks: 30 University Exam Marks: 70

## UNIT-I

Artificial Neural Networks:

Introduction to neural networks, biological neurons, artificial neurons, McCulloch-Pitt's neuron model, neuron modeling for artificial neural systems, feed forward network, perceptron network, Supervised and un-supervised learning

**Learning Rules:** Hebbian learning Rule, Perceptron learning Rule, Delta learning Rule, Winner-take-all learning rule, Out-star learning rule

### UNIT-II

**Supervised Learning:** Perceptrons, exclusive OR problem, single layer perceptron network, multi-layer feed forward networks: linearly non separable patter classification, delta learning rule for multi perceptron layer, error back propagation algorithm, training errors, ADALINE, introduction to Radial Basis Function Networks(RBFN).

#### UNIT-III

**Un-Supervised Learning:** Hamming net, Max net,. Winner –take –all learning, counter propagation network, feature mapping, self-organising feature maps

Applications of neural Algoritms: elementary aspects of applications of character recognition

Neural Network control applications: Process identification, Basic dynamic learning control architecture

#### **UNIT-IV**

## Fundamentals of fuzzy logic and fuzzy sets:

Definition of fuzzy set, a-levl fuzzy set, cardinality, operations on fuzzy sets: union, intersection, complement, cartecian product, algebraic sum, definition of fuzzy relation, properties of fuzzy relations, fuzzy composition

#### UNIT-V

**Design of Fuzzy Systems:** Components of fuzzy systems, functions of fuzzification, Rule base patterns, Inference mechanisms, methods of de-fuzzification: COG,COA, MOM, Weighted average, height methods

Design of Fuzzy Systems for temperature setting of water heater, fuzzy system for control of air conditioner

#### **TEXT BOOKS:**

- 1. Jacek M Jurada, "Introduction to atificail Neural Systems", Jaico Publications
- 2. Zimmerman, "Fuzzy Set Theory and its Applications", Kluwer Academic Publishers
- 3. Timothy Ross, "Fuzzy Logic with Engineering Applications", (Mc GrawHill)

## EET24: SWITCH MODE POWER CONVERTERS (ELECTIVE-III)

Credits – 3 L: T: P::4: 0:0

## Sessional Marks: 30 University Exam Marks: 70

## UNIT I

## NON-ISOLATED DC-DC CONVERTERS

Basic Types of Switching Power Supplies – Volt-Sec balance – Non-Isolated Switched-Mode DC-to-DC Converters – Buck Converter – Boost Converter – Buck-Boost Converter – Cuk Converter – SEPIC and Zeta Converters – Comparison of Non-Isolated Switched mode DC-to-DC Converters.

#### UNIT II

## **ISOLATED DC-DC CONVERTERS**

Need of Transformer Isolations in high frequency Power conversion - Isolated Switched Mode DC-to-DC Converters – Single Switch Isolated DC-to-DC Converters – Forward, Flyback, Push-Pull, Half and Full Bridge Converters – Multi Switch Isolated DC-to-DC Converters – Comparison of Isolated and Non-Isolated Switched Mode DC-to-DC Converters.

UNIT III

## **RESONANT CONVERTERS**

Classification of Resonant converters-Basic resonant circuits- Series resonant circuit-parallel resonant circuits- Resonant switches, Concept of Zero voltage switching, principle of operation, analysis of M-type and L-type Resonant Buck and boost Converters.

# UNIT IV

## DYNAMIC ANALYSIS OF DC-DC CONVERTERS

Formulation of dynamic equations of buck and boost converters, State-Space Models, Averaged Models, linearization technique, small-signal model and converter transfer functions, Significance of Small Signal Models, Dynamical Characterization.

## UNIT V

## **CONTROLLER DESIGN**

Review of frequency-domain analysis of linear time-invariant systems, controller specifications, Proportional (P), Proportional plus Integral (PI), Proportional, Integral plus Derivative controller (PID), selection of controller parameters for Isolated and Non-Isolated DC -DC Converters. *Text Books:* 

1. Andrzej M. Trzynadlowski, **Introduction to Modern Power Electronics**, 2nd Edition, WILEY-INDIA Edition, 2012.

2.Robert Erickson and Dragon Maksimovic, **Fundamentals of Power Electronics**, Springer Publications., 2nd Edition, 2001.

3.Issa Batarseh, **Fundamentals of Power Electronics**, John Wiley Publications, 2009. **Reference Books:** 

1. Philip T.Krein Elements of Power Electronics - Oxford University Press, 1997.

2. L. Umanand Power Electronics, Tata Mc-Graw Hill, 2004.

#### ECT34: SATELLITE COMMUNICATION (ELECTIVE-III)

Credits – 3 L: T: P::4: 0:0

## Sessional Marks: 30 University Exam Marks: 70

## UNIT – I

**Orbits:** Kepler's law, Orbital elements, Apogee and Perigee heights, Orbital perturbation, Sun synchronous orbit and geostationary orbit, Launching orbit.

#### $\mathbf{UNIT}-\mathbf{II}$

**Space Segment:** Power supply, Attitude control, Station Keeping, Thermal control, TT&C subsystem, Transponders, Propulsion system, Antenna subsystem.

#### UNIT – III

**Space Link:** ERIP, Transmission losses, Link power budget equation system noise,  $E_b/E_o$  and C/N ratios, Up – link, Down link.

## $\mathbf{UNIT} - \mathbf{IV}$

Earth Station: Antenna types, High power amplifier, Low – amplifier, Up converter, Down converter.

#### $\mathbf{UNIT}-\mathbf{V}$

Multiple Access: FDMA, SPADE network, TDMA, Frame structure, CDMA, VSAT and MSATs.

#### **Text Books:**

- 1. Dennis Roddy, "Satellite Communications", Mc Graw Hill, 1995.
- 2. Tri. T. Ha, "Digital Satellite Communications", Mc Graw Hill, 1986.
- 3. K. N. Rajarao, "Fundamentals of Satellite Communication", Prentice Hall of India.

EET25: SMART ELECTRICAL GRIDS (ELECTIVE-III)

Credits – 3 L: T: P::4: 0:0

#### THE SMART GRID

Introduction, Ageing Assets and Lack of Circuit Capacity, Thermal Constraints, Operational Constraints, Security of Supply, National Initiatives, Early Smart Grid Initiatives, Active Distribution Networks, Virtual Power Plant, Other Initiatives and Demonstrations, Overview of The Technologies Required for The Smart Grid.

#### UNIT II

#### **COMMUNICATION TECHNOLOGIES**

**Data Communications:** Introduction, Dedicated and Shared Communication Channels, Switching Techniques, Circuit Switching, Message Switching, Packet Switching, Communication Channels, Wired Communication, Optical Fibre, Radio Communication, Cellular Mobile Communication, Layered Architecture and Protocols, The ISO/OSI Model, TCP/IP

**Communication Technologies:** IEEE 802 Series, Mobile Communications, Multi Protocol Label Switching, Power line Communication, Standards for Information Exchange, Standards For Smart Metering, Modbus, DNP3, IEC61850

#### UNIT III

## INFORMATION SECURITY FOR THE SMART GRID

Introduction, Encryption and Decryption, Symmetric Key Encryption, Public Key Encryption, Authentication, Authentication Based on Shared Secret Key, Authentication Based on Key Distribution Center, Digital Signatures, Secret Key Signature, Public Key Signature, Message Digest, Cyber Security Standards, IEEE 1686: IEEE Standard for Substation Intelligent Electronic Devices(IEDs) Cyber Security Capabilities, IEC 62351: Power Systems Management And Association Information Exchange – Data and Communication Security.

#### UNIT IV

#### SMART METERING AND DEMAND SIDE INTEGRATION

Introduction, smart metering – evolution of electricity metering, key components of smart metering, smart meters: an overview of the hardware used – signal acquisition, signal conditioning, analogue to digital conversion, computation, input/output, communication.

Communication infrastructure and protocols for smart metering- Home area network, Neighbourhood Area Network, Data Concentrator, meter data management system, Protocols for communication. Demand Side Integration- Services Provided by DSI, Implementation of DSI, Hardware Support, Flexibility Delivered by Prosumers from the Demand Side, System Support from DSI.

UNIT V

#### TRANSMISSION AND DISTRIBUTION MANAGEMENT SYSTEMS

Data Sources, Energy Management System, Wide Area Applications, Visualization Techniques, Data Sources and Associated External Systems, SCADA, Customer Information System, Modelling and Analysis Tools, Distribution System Modelling, Topology Analysis, Load Forecasting, Power Flow Analysis, Fault Calculations, State Estimation, Applications, System Monitoring, Operation,

Management, Outage Management System, Energy Storage Technologies, Batteries, Flow Battery, Fuel Cell and Hydrogen Electrolyser, Flywheels, Superconducting Magnetic Energy Storage Systems, Supercapacitors.

#### **Text Books:**

- 1. Smart Grid, Janaka Ekanayake, Liyanage, Wu, Akihiko Yokoyama, Jenkins, Wiley Publications, 2012.
- 2. Smart Grid: Fundamentals of Design and Analysis, James Momoh, Wiley, IEEE Press., 2012.

## UNIT I

## **ELECTIVE-IV**

S.No	Course Code	Course Title
1	EET26	High Voltage Engineering
2	CST47	Computer Networking
3	ECT36	Digital Image Processing
4	EET27	Electrical Machine Design
		MOOCS

## EET26: HIGH VOLTAGE ENGINEERING (ELECTIVE-IV)

Credits – 3 L: T: P::4: 0:0

## Sessional Marks: 30 University Exam Marks: 70

## UNIT –I

Generation of high D.C. and A.C. voltages – Introduction, Half wave rectifier circuit, Cockroft-Walton voltage multiplier circuit, Electrostatic generator, Generation of high a.c. voltages by cascaded transformers, Series resonant circuit.

Generation of impulse voltages and currents – Definitions, Impulse generator circuits, Analysis of circuit 'a', Analysis of circuit 'b', Multistage impulse generator circuits, Triggering of impulse generator, Impulse current generation.

#### UNIT -II

Measurement of high voltages and currents – Introduction, Sphere gap, uniform field spark gap, Rod gap, Electrostatic voltmeter, Generating voltmeter, Chubb-Fortescue method, Impulse voltage measurement using voltage dividers, Measurement of high d.c., a.c. and impulse currents.

#### UNIT -III

High voltage testing of electrical equipment – Testing of overhead line insulators, Testing of cables, Testing of bushings, Testing of power capacitor, Testing of power transformers, Testing of circuit breakers.

#### UNIT -IV

Non-Destructive insulation techniques – Measurement of resistivity, Measurement of dielectric constant and loss factor, High voltage schering bridge measurement of large capacitances, Partial discharges.

#### UNIT –V

Break down mechanism of gases, Liquid and solid insulating materials – Introduction, Mechanism of breakdown of gases, Townsend's first ionization coefficient, Cathode processes secondary effects, townsend's second ionization coefficient, Townsend breakdown mechanism, Paschen's law, Principles of breakdown of solid and liquid dielectrics.

## TEXT BOOK

- 1. C.L.Wadhwa High voltage Engineering
- 2. Dieter Kind An introduction to high voltage experimental technique
- 3. Kuffel & Zaengle High voltage engg.fundamentals
- 4. M. S.Naidu & Kamaraju High voltage engg .fundamentals

#### **CST47: Computer Networking**

(ELECTIVE-IV)

Credits – 3 L: T: P::4: 0:0

#### UNIT –I

Review of Protocol Layer: Data Link Layer, Design Issues, Elementary Data Link Sliding Window Protocols Example Data Link Protocols

#### UNIT –II

The Medium Access Sub Layer: Channel Allocation Problem, Multiple Access Protocols(ALOHA, CSMA, collision free protocols, WDMA, wireless LAN protocols), Review of IEEE Standards for LANS, LAN Bridges.

#### UNIT –III

The Network layer Design issues: Routing algorithms (optimality principal, shortest pathing, flooding, distance vector routing, link state routing), Congestion control algorithms, congestion control in packet switched network, the transport layer, the transport services, transport protocols.

#### UNIT -IV

Internetworking: Principles of Inter networking, internet network layer, internet transport protocols (TCP & UDP), Multicasting, routing protocols, autonomous system and approaches to routing.

#### UNIT –V

The application layer: Security, DNS, SNMP, E-Mail, WWW, Multimedia, SMTP, HTTP, overview, network management systems.

#### Text books:

1. **Computer Networks:** Computer Networks, 5th Edition, Andrew S. Tanenbaum, David J. Wetherall, 2011, Pearson

#### **References:**

1. Data communication and networking, Behrouz A. Forouzan, 5th Edition, TMH, 2013

2. Computer networks and internets with internet applications, DOUGLASE. Corner, 5th

Edition, Pearson Education, 2008.

#### UNIT – I

**Digital Image Fundamentals :** Digital Image representation, Digital image processing systems, Visual perception, sampling and quantization, Basic relationships between pixels and imaging geometry.

#### UNIT – II

**Image Transforms** : Discrete Fourier Transform, Properities of 2 – D Fourier transform, Fast Fourier transform, Walsh, Hadmard, and Discrete cosine transform.

#### UNIT – III

**Image Enhancement :** Background enhancement by point processing Histogram processing, Spatial filtering, Enhancement in frequency domain, Image smoothing, Image sharpering, Colour image.

#### UNIT – IV

**Image Restoration** : Degradation model, Algebraic approach to restoration, Inverse filtering, Least mean, Square filters, constrained least square restoration.

#### $\mathbf{UNIT} - \mathbf{V}$

**Image Coding :** Fidelity criteria, Encoding process, Error free coding, Image coding relative to fidelity criterion, Image compression and decompression techniques.

## **Text Books :**

1. Digital Image Processing by R.G. Gonzales and R.E. Woods, Addison Wesley 1985.

2. Fundamental of Digital Image Process, A.K. Jain, Prentice Hall, India, New Delhi 1983.

# **EET27: ELECTRICAL MACHINE DESIGN**

(ELECTIVE-IV)

Credits – 3 L: T: P::4: 0:0 Sessional Marks: 30 University Exam Marks: 70

## UNIT-I

**The design Problem:** Basic considerations, design specifications, IS specifications, design constraints, design specifications for transformers and rotating machines

**Design of transformers:** Types of core constructions, output equation, principles of design of core, windings, yoke, estimation of main dimensions( H & W) for single phase shell type , core type and 3-phase core type transformers. Estimation of no load current from design data

#### UNIT-II

**Design of dc machines:** Choice of number of poles, selection of number of armature slots, choice of armature winding, design of armature, design of commutator

General Concepts for design of rotating machines: Output equation of dc machines, separation of D and L, Choice of specific loadings

Design of field system: tentative design of field system, estimation of filed current

## UNIT-III

**Design of 3-phase Induction motor**: Output equation of ac machines, separation of D and L, ranges of specific loadings

Stator Design: selection of number of slots, estimation of turns per phase, design of conductor cross section

Rotor design: Selection of number of rotor slots, principles of design of squirrel cage and slip ring rotor

#### UNIT-IV

**Design of synchronous machines:** Choice of armature windings, types of armature windings, separation of D and L. Design of armature, choice of number of slots, estimation of turns per phase, conductor cross section, field system design for salient pole and cylindrical pole rotor machines

## UNIT –V

## Heating and Cooling of Electrical Machines:

Estimation of temperature rise, heating time constant, cooling time constant, heating and cooling time curves, volume of coolant required. Design of tansformer tank with tubes: estimation of temperature rise, deign of transformer tank

#### TEXT BOOKS:

- 1. A.K.Sawhney, "Electrical Machine Design" (Dhanpatrai & Sons)
- 2. Balbir Singh, "Electrical Machine Design" (Khanna Publishers)

# **ELECTIVE-V**

S.No	Course Code	Course Title
1	EET28	High Voltage Direct Current Transmission
2	EET29	Digital Control Systems
3	ECT45	Microcontrollers & Its Applications
4	EET30	Special Machines

**EET28: HIGH VOLTAGE DIRECT CURRENT TRANSMISSION** 

(ELECTIVE-V)

**Sessional Marks: 30 University Exam Marks: 70** 

## UNIT-I

## **DC** Power Transmission Technology:

Introduction, Comparison of AC DC transmission, Converter station, Description of DC Transmission systems, Choice of voltage level, Modern trends in DC transmission

#### **UNIT-II**

#### **Analysis of HVDC Converters:**

Pulse number, Choice of converter configuration, valve rating. Transformer, simplified analysis of graetz circuit with and without overlap, rectifier and inverter waveforms, converter bridge characteristics

**UNIT-III** 

## **Converter and HVDC System Control:**

## Principle of DC Link control, Converter control characteristics, system and control hierarchy, firing angle control, converter and excitation angle control, starting and stopping of DC Link, Power control, higher level controllers

#### **UNIT-IV**

## **Converter Faults:**

Protection against over currents, over voltages in converter station, surge arresters, protection against over voltages

Smoothing reactor, DC Line, Transient over-voltages in DC line, protection of DC line, DC breakers **UNIT-V** 

## **Reactive Power requirements in steady state:**

Sources of reactive power, static var systems, generation of Harmonics, Design of AC Filters, Dc Filters, Carrier frequency and RI noise.

#### **Text Books:**

- 1. K R Padiyar, "HVDC Transmission Systems"
- 2. S. Rao, "EHV AC and HVDC Transmission engineering and Practice"

# Credits - 3

L: T: P::4: 0:0

#### EET29: DIGITAL CONTROL SYSTEMS (ELECTIVE-V)

Credits – 3 L: T: P::4: 0:0

## Sessional Marks: 30 University Exam Marks: 70

## UNIT I

Introduction:

Digital Control Systems, quantization and quantization error, Z-transform, Z-transform of elementary functions, properties of Z-transform, Inverse Z-transform, Z-transform method for solving difference equations.

## UNIT II

## Z plane Analysis of Discrete time control:

Introduction, Impulse Sampling and data hold, pulse transfer function, realization of digital controllers and digital filters.

## UNIT –III

## Design of Digital Control Systems by Conventional Methods:

Introduction, Mapping between S plane and Z plane, transient and steady response analysis, Design based on frequency response methods, Analytical Design Method.

#### UNIT –IV

#### State Space Analysis:

State Space representation of digital systems, solving discrete space equations, pulse transfer function matrix, discretization of continuous time space equations, Lyapunov stability analysis.

#### UNIT -V

## Pole Placement and State Observers Design:

Controllability, Observability, useful transformations of state space analysis and design, Design through pole placement, state observer.

#### **Text Books:**

1. Katsuhiko Ogatta, "Discrete time Control Systems" 2<sup>nd</sup> Edition, Prentice Hall of India (2005).

**2.** I.J.Nagarath "State space methods and digital control systems", New Age International (2004). **Reference:** 

1. C.V.Jones, "Unified Theory of Electrical Machines", Butterworth's Publishers.

2. J.Meisel,"Principles of Electromechanical Energy Conversion", McGraw Hill.

#### **ECT45: MICRO CONTROLLERS & ITS APPLICATIONS**

(ELECTIVE-V)

Credits – 3 L: T: P::4: 0:0 Sessional Marks: 30 University Exam Marks: 70

#### UNIT I

Introduction: Microprocessors vs Microcontrollers, Microcontroller Survey. The 8051Architecture: '8051 Microcontroller Hardware, Input/output pins, ports, and circuits, External memory, Counters and Timers, Serial Data input/output, Interrupts.

#### UNIT II

Assembly Language Programming of 8051: Addressing modes, Instruction set: Data transfer, Logical, Arithmetic, Jump/call, group of instructions. Programming examples.

#### UNIT III

An 8051 micro controller design: External memory and memory space decoding, Reset and clock circuits, Expanding I/O, Memory mapped I/O, Memory address decoding.

Timing subroutines: Time delays, Pure software time delay, Software polled timer, Pure hardware delay. UNIT IV

Applications:

Keyboards: - Key switch factors, key configurations, programs for key boards. Displays: - 7-segment Numeric display Intelligent LED display. Pulse measurement : Measuring frequency, Pulse width measurement. D/A, and A/D conversions: - D/A and A/D conversion using Intel 8051. Multiple Interrupts: - Hardware circuits for multiple Interrupts.

### UNIT V

Introduction to Motorola 68HC11 micro controller : CPU Registers and Internal RAMs. Memories in 68HC11 based system, Interfacing external memories, I/O Ports, Interrupts, Typical instructions.

## **TEXT BOOKS:**

- 1. Kenneth J.Ayala, The 8051 microcontrollers, Architecture, Programming and applications ", 2<sup>nd</sup> edition, Penram International publishing (India).
- 2. Rajkamal, "The Concepts and features of micro controllers", Wheeler publishing.
# EET30: SPECIAL MACHINES

(ELECTIVE-V)

Credits – 3 L: T: P::4: 0:0

#### UNIT-I

**Field aspects of electrical machines:** Review of Maxwell's equations and solution of Laplace's and Poisson's equations., Concept of magnetic vector potential. Eddy current braking.Linear motors: Basic principle of operation and types. End effects & transverse edge effects. Field analysis & Propulsion force; equivalent circuit.

#### **UNIT-II**

**Stepper motors:** Construction and operation of Stepper Motors: variable reluctance, permanent magnet, hybrid stepper motors, characteristics of stepper motors.Drive Circuits for Stepper motors: Block diagram of stepper motor controller, logic sequence generator, power drivers, current suppression circuits, acceleration and deceleration circuits

# UNIT-III

**Microprocessor control of stepper motors:** microprocessor based stepper motor controller, PC based stepper motor controller. Micro-stepping Control of Stepper motors: the micro-stepping principle, advantages of micro stepping, design of basic micro-stepping controller. Applications of stepper motor

#### UNIT-IV

**Brushless DC motor:** principle of operation of BLDC motor, squre wave permanent magnet brushless motor drives, sine wave permanent magnet Brushless DC motor drives, phasor diagram, torque speed characteristics, controllers for BLDC motors, alternating current drives with PM and synchronous reluctance hybrid motors.

# UNIT-V

**Switched Reluctance Motor Drives**: Types of SR motors, principle of operation, static torque production, energy conversion loop, dynamic torque production. Converter Circuits, Control of SR motors: current regulation, commutation, torque speed characteristics, shaft position sensing

# **TEXT BOOKS**:

- 1. "V V Athani, " Stepper Motors Fundamentals, Applications, and Design", New Age
- 2. TJE Miller, "Brushless Permanent-Magnet and Reluctance Motor Drives" Clarendon Press, Oxford.

# **ELECTIVE-VI**

S.No	Course Code	Course Title
1	EET31	Electrical Distribution Systems
2	ECT19	Embedded Systems
3	EET32	Flexible AC Transmission Systems
4	CST44	Computer Organization& Architecture

# EET31: ELECTRICAL DISTRIBUTION SYSTEMS

(ELECTIVE-VI)

Credits – 3 L: T: P::4: 0:0 Sessional Marks: 30 University Exam Marks: 70

# UNIT-I

**Distribution System planning and Automation:** Introduction, distribution system planning, factors affecting system planning, present techniques, planning models, planning in the future-role of computers in distribution system, system automation. Load Characteristics, basic definitions, loss factor, classification of loads(Residential, commercial, agricultural, Industrial) and their characteristics

#### **UNIT-II**

Application of distribution transformers, types, regulation and efficiency. Design of subtransmission lines and Distribution substations: Sub-transmission, distribution substations, substation schemes, location, rating of distribution substation, substation service area with

n primary feeders, comparison of four and six feeder patterns, derivation of constant K

#### **UNIT-III**

**Design considerations of primary systems:** Introductory aspects, Radial and loop types of primary feeders, primary network, voltage levels, feeder loading, tie-lines. Distribution feeder exit, rectangular radial type development, radial feeder with uniformly and no-uniformly distributed load-application of the ABCD general circuit constants to radial feeders.

**Design considerations of secondary systems:** Introductory aspects, secondary voltage levels, the present design practice, secondary banking, secondary networks, high voltage and low voltage distribution systems and their salient features, different types of HVDS

#### UNIT-IV

Voltage drop and power loss calculation, derivation for voltage drop and power loss in 3-phase and non 3-phase primary lines, percent power loss, methods to analyze distribution feeder costs. **Protective devices and co-ordination:** Objectives of distribution system protection, types of common faults and procedure for fault calculations, protective devices, principles of operation of fuses, circuit breakers, consideration of protective devices, general co-ordination procedure, fault current calculations

# UNIT-V

**Application of capacitors to distribution systems:** Basic definitions, power capacitor, effect of shunt capacitors(fixed and switched), power factor correction, capacitor allocation, capacitor installation types, economic justification, procedure to determine the best capacitor location, mathematical procedure to determine the optimum capacitor location, equipment for voltage control ,effect of series capacitor, effect of AVB/AVR, line drop compensation, voltage fluctuations

# **TEXT BOOKS:**

- 1. Turan Gonen, "Electric Power Distribution System Engineering" (Mc GrawHill)
- 2. A S Pabla, "Electrical Power Distribution", Tata McGraw Hill, 5th Edition

### ECT19: EMBEDDED SYSTEMS (ELECTIVE-VI)

Credits – 3 L: T: P::4: 0:0

# Sessional Marks: 30 University Exam Marks: 70

# UNIT – I

**Introduction:** Embedded systems overview, Design challenge, Processor technology, IC technology, Design technology. RT-Level combinational logic, Sequential logic (RT-Level), Custom single purpose processor design (RT-Level), Optimizing custom single purpose processors.

# UNIT – II

General Purpose Processors: Basic architecture, Development environment, Application specific system depth, Set processors (ASIPs).

# UNIT – III

**DSP Architecture:** Special architectural need for pipelining and parallelism, Need for more functional units and buses, Harvard architecture, SIMD processors, Architectural features of a specific processor ADSP 21065/TMS 32025.

#### $\mathbf{UNIT} - \mathbf{IV}$

**State Machine and Concurrent Process Models:** Introduction, Models Vs languages, Finite State Machine with Data path model (FSMD), Using State Machines, Program State Machine (PSM),Concurrent Process Model, Concurrent Processes, Communication among processors, Synchronization among processes, Implementation, Data flow model, Real-Time Systems.

## $\mathbf{UNIT} - \mathbf{V}$

**Introduction Automation:** The parallel evolution of complication and synthesis, Logic, RT, Behavioral synthesis, System synthesis and hardware/software code sign, Verification of hardware/software co-simulation, Reuse of intellectual property codes.

#### **Text Books:**

- 1. Embedded Systems Design A unified Hardware/Software introduction by Frank Vahid, Tony D. Givargis, John Wiley & Sons. Inc. 2002.
- 2. Analog Devices/Texas Intruments DSP User manuals/Application Notes (Unit III)
- 3. Introduction to embedded systems by Raj Kamal, TMH, 2002.
- 4. Embedded Systems by Raj Kamal, McGraw-Hill.

# **Reference Books:**

- 1. Jonathan W. Vanvano, Embedded Microcomputer Systemms Real Time Interfacing, 3<sup>rd</sup> edition, Cengage Learning, 2012.
- 2. David.E.Simon, An Embedded Software primer, 1<sup>st</sup> edition, 5<sup>th</sup> impression, Addison Wesley professional,2007.
- 3. C.M.krishna, Kang G.Shin Real time Systems, International editions, MC Graw Hill, 1997.

#### EET32: FLEXIBLE AC TRANSMISSION SYSTEMS (ELECTIVE-VI)

Credits – 3 L: T: P::4: 0:0

# UNIT I

# CONCEPTS OF FLEXIBLE AC TRANSMISSION SYSTEMS

Transmission line Interconnections, Power flow in parallel lines, Mesh systems, Stability considerations, Relative importance of controllable parameters, Basic types of FACTS controllers, Shunt controllers, Series controllers, Combined shunt and series controllers, Benefits of FACTS.

#### **UNIT II**

# VOLTAGE AND CURRENT SOURCED CONVERTERS

Concept of Voltage Sourced Converters, Single Phase Full Wave Bridge Converter, Three Phase Full Wave Bridge Converter, Transformer Connections for 12-Pulse Operation, 24 and 48-Pulse Operation, Three Level Voltage Sourced Converter, Pulse Width Modulation (PWM) Converter, Converter Rating, Concept of Current Sourced Converters, Thyristor based converters, Current Sourced Converters, Thyristor based Converters, Current Sourced Converters, Voltage Sourced Converters.

# UNIT III

# STATIC SHUNT COMPENSATORS

Objectives of Shunt Compensation, Midpoint Voltage Regulation for Line Segmentation, End of Line Voltage Support to Prevent Voltage Instability, Improvement of Transient Stability, Power Oscillation Damping, Methods of Controllable VAR Generation, Variable Impedance Type Static Var Generators, Switching Converter Type VAR Generators, Hybrid Var Generators, SVC and STATCOM, Transient Stability Enhancement and Power Oscillation Damping, Comparison Between STATCOM and SVC, V-I, V-Q Characteristics, Response Time.

# UNIT IV

# STATIC SERIES COMPENSATORS

Objectives of Series Compensation, Voltage Stability, Improvement of Transient Stability, Power Oscillation Damping, Subsynchronous Oscillation Damping, Variable Impedance Type Series Compensators, GTO Thyristor Controlled Type Series Capacitor (GCSC), Thyristor Switched Series Capacitor (TSSC), Thyristor-Controlled Series Capacitor(TCSC),

Basic Operating Control Schemes for GCSC, TSSC, and TCSC, Switching Converter Type Series Compensators, The Static Synchronous Series Capacitor(SSSC), Transmitted Power Versus Transmission Angle Characteristic, Control Range and VA Rating, Capability to Provide Real Power Compensation.

#### UNIT V

# POWER FLOW CONTROLLERS

The Unified Power Flow Controller-Basic Operating Principles, Conventional Transmission Control Capabilities, Independent Real and Reactive Power Flow Control. Control Structure, Basic Control System for P and Q Control, Dynamic Performance, The Interline Power Flow Controller (IPFC), Basic Operating Principles and Characteristics, Generalized and Multifunctional FACTS Controllers.

#### **Text Books**:

1. Concepts and Technology of Flexible AC Transmission Systems - Understanding FACTS: Narain G. Hingorani, Laszlo Gyugyi - Standard Publishers Distributors - IEEE Press – First Edition –2001.

# **CST44: COMPUTER ORGANIZATION AND ARCHITECTURE**

Credits – 3	Sessional Marks: 30
L: T: P::4: 0:0	<b>University Exam Marks: 70</b>

#### UNIT-I

BASIC Structure of Computers, computer types, functional unit, bus structures ,software& performance , multiprocessors & multi-computers

**Basic Computer Organization -** Functions of CPU, I/O Units, Memory Instruction: Instruction Formats - One address, two addresses, zero addresses and three addresses and comparison; addressing modes , conditional branch instructions, Program Interrupts: Types of Interrupts.

#### **UNIT-II**

**Register Transfer Language(RTL) and micro operations:** RTL, register transfer ,bus and memory transfer, arithmetic micro operations ,shift micro operations ,logic micro operations ,arithmetic logic shift unit ,instruction codes , computer registers , instruction cycle, memory reference instructions , I/O and interrupts , Stack organization , Data transfer and manipulation , Risc/Cisc introduction

#### **UNIT-III**

#### **Memory Organizations**

Memory hierarchy, Main Memory, RAM, ROM Chips, Memory Address Map, Memory Connection to CPU, associate memory, Cache Memory, Data Cache, Instruction cache, Miss and Hit ratio, Access time associative, set associative, mapping, waiting into cache, Introduction to virtual memory, direct memory access.

#### **UNIT-IV**

8086 CPU Pin Diagram- Special functions of general purpose registers. Segment register, concept of pipelining, 8086 Flag register, Addressing modes of 8086.

8086-Instruction formats: assembly Language Programs involving branch & Call instructions, sorting, evaluation of arithmetic expressions.

#### UNIT-V

Pipeline: Introduction, arithmetic pipeline, instruction pipeline, RISC pipeline

Vector Processing: Vector processing, array processors,

**Multiprocessors:** characteristics, interconnection structures, Interprocessor arbitration, interprocessor communication and synchronization, cache coherence, shared memory multiprocessors.

# **TEXT BOOKS:**

- 1. Computer System Architecture: Moris Mano
- 2. Advanced Micro Processor and Peripherals Hall/ A K Ray
- 3. Computer Organization by Carl Hamacher, zvonkovranesic, safwatzaky

#### **REFERENCE BOOKS:**

- 1. Computer Organization and Architecture William Stallings Sixth Edition, Pearson/PHI.
- 2. Structured Computer Organization and Design Andrew S. Tanenbaum, 4th Edition PHI/Pearson.