

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

S.NO.	Course Number	Name of the Course	Instructions (hrs per week)			Evaluation				Total Marks	
			Theory / Tutorial	Practical	Credits	Internal Exam		External Exam			
						Duration hrs	Max. Marks	Duration hrs	Max. Marks		
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	
<b>PRACTICALS</b>											
S.NO.	Course Number	Name of the Course	Instructions (hrs per week)			Evaluation				Total Marks	
			Theory / Tutorial	Practical	Credits	Continuous Evaluation Max Marks	Internal Exam		External Exam		
							Duration hrs	Max. Marks	Duration in hrs		Max. Marks
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
<b>TOTAL</b>			<b>20</b>	<b>10</b>	<b>25</b>					<b>900</b>	

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I YEAR – II SEMESTER (2016-17)**

S.NO.	Course Number	Name of the Course	Instructions (hrs per week)			Evaluation				Total Marks	
			Theory / Tutorial	Practical	Credits	Internal Exam		External Exam			
						Duration hrs	Max. Marks	Duration hrs	Max. Marks		
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	
<b>PRACTICALS</b>											
S.NO.	Course Number	Name of the Course	Instructions (hrs per week)			Evaluation				Total Marks	
			Theory / Tutorial	Practical	Credits	Continuous Evaluation Max Marks	Internal Exam		External Exam		
							Duration hrs	Max. Marks	Duration in hrs		Max. Marks
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
<b>TOTAL</b>			<b>24</b>	<b>6</b>	<b>27</b>					<b>800</b>	

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II YEAR – I SEMESTER (2016-17)**

S.NO.	Course Number	Name of the Course	Instructions (hrs per week)			Evaluation				Total Marks	
			Theory / Tutorial	Practical	Credits	Internal Exam		External Exam			
						Duration hrs	Max. Marks	Duration hrs	Max. Marks		
1	BST07	Engineering Mathematics-II	4	-	4	2	30	3	70	100	
2	EET18	Electrical Technology	4	-	4	2	30	3	70	100	
3	ECT02	Signals and Systems	4	-	4	2	30	3	70	100	
4	ECT03	Digital Electronics	4	-	4	2	30	3	70	100	
5	EET04	Electro Magnetic Theory	4	-	4	2	30	3	70	100	
6	ECT04	Electronic Circuits	3	-	3	2	30	3	70	100	
<b>PRACTICALS</b>											
S.NO.	Course Number	Name of the Course	Instructions (hrs per week)			Evaluation				Total Marks	
			Theory / Tutorial	Practical	Credits	Continuous Evaluation Max Marks	Internal Exam		External Exam		
							Duration hrs	Max. Marks	Duration in hrs		Max. Marks
7	ECP01	Electronic Devices Lab	-	2	1	20	2	20	3	60	100
8	ECP02	Electrical Circuits and Digital Electronics Lab	-	2	1	20	2	20	3	60	100
9	ECP03	Electronic Circuits Lab	-	2	1	20	2	20	3	60	100
<b>TOTAL</b>			23	6	26						900

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II YEAR – II SEMESTER (2016-17)**

S.NO.	Course Number	Name of the Course	Instructions (hrs per week)			Evaluation				Total Marks	
			Theory / Tutorial	Practical	Credits	Internal Exam		External Exam			
						Duration hrs	Max. Marks	Duration hrs	Max. Marks		
1	BST09	Managerial Economics and Financial Analysis	4	-	4	2	30	3	70	100	
2	ECT05	Analog Communications	4	-	4	2	30	3	70	100	
3	ECT06	Probability Theory and Random Process	4	-	4	2	30	3	70	100	
4	EET07	Control Systems	4	-	4	2	30	3	70	100	
5	ECT07	Analog IC Applications	4	-	4	2	30	3	70	100	
6	ECT08	EM waves and Transmission Lines	4	-	4	2	30	3	70	100	
<b>PRACTICALS</b>											
S.NO.	Course Number	Name of the Course	Instructions (hrs per week)			Evaluation				Total Marks	
			Theory / Tutorial	Practical	Credits	Continuous Evaluation Max Marks	Internal Exam		External Exam		
							Duration hrs	Max. Marks	Duration in hrs		Max. Marks
7	ECP04	Analog Communications Lab	-	2	1	20	2	20	3	60	100
8	ECP05	IC Applications Lab	-	2	1	20	2	20	3	60	100
<b>TOTAL</b>					26						800

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**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**  
**III YEAR – I SEMESTER (2016-17)**

S.NO.	Course Code	Name of the Course	Instructions (hrs per week)			Evaluation				Total Marks	
			Theory / Tutorial	Practical	Credits	Internal Exam		External Exam			
						Duration (hrs)	Max. Marks	Duration in hrs	Max. Marks		
1	BST10	Management Science	3	-	3	2	30	3	70	100	
2	ECT09	Microprocessors and Interfacing	4	-	4	2	30	3	70	100	
3	ECT10	Digital Signal Processing	4	-	4	2	30	3	70	100	
4	ECT11	Antennas and Wave Propagation	4	-	4	2	30	3	70	100	
5	ECT12	Digital Communication	4	-	4	2	30	3	70	100	
6	CST08	Computer Organization	4	-	4	2	30	3	70	100	
<b>PRACTICALS</b>											
S.NO.	Course Code	Name of the Course	Instructions (hrs per week)			Evaluation				Total Marks	
			Theory / Tutorial	Practical	Credits	Continuous Evaluation Max Marks	Internal Exam		External Exam		
							Duration in hrs	Max. Marks	Duration in hrs		Max. Marks
7	ECP06	Microprocessors Lab	-	2	1	20	2	20	3	60	100
8	ECP07	Digital Communication Lab	-	2	1	20	2	20	3	60	100
9	ECP08	Digital Signal Processing Lab	-	2	1	20	2	20	3	60	100
<b>TOTAL</b>					26					900	

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III YEAR – II SEMESTER (2016-17)**

S.NO.	Course Code	Name of the Course	Instructions (hrs per week)			Evaluation				Total Marks	
			Theory / Tutorial	Practical	Credits	Internal Exam		External Exam			
						Duration (hrs)	Max. Marks	Duration in hrs	Max. Marks		
1	ECT13	Digital Design using VHDL	4	-	4	2	30	3	70	100	
2	ECT14	Microcontroller and Interfacing	4	-	4	2	30	3	70	100	
3	ECT15	VLSI Design	4	-	4	2	30	3	70	100	
4	CST43	Basics of Computer Networks	4	-	4	2	30	3	70	100	
5		Elective -I	3	-	3	2	30	3	70	100	
6		Elective -II	3	-	3	2	30	3	70	100	
<b>PRACTICALS</b>											
S.NO.	Course Code	Name of the Course	Instructions (hrs per week)			Evaluation				Total Marks	
			Theory / Tutorial	Practical	Credits	Continuous Evaluation Max Marks	Internal Exam		External Exam		
							Duration in hrs	Max. Marks	Duration in hrs		Max. Marks
7	ECP09	VHDL Lab	-	2	1	20	2	20	3	60	100
8	ECP10	Microcontroller Lab	-	2	1	20	2	20	3	60	100
<b>TOTAL</b>					24						800

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**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**  
**IV YEAR – I SEMESTER (2016-17)**

S.NO.	Course Code	Name of the Course	Instructions (hrs per week)			Evaluation				Total Marks	
			Theory/ Tutorial	Practical	Credits	Internal Exam		External Exam			
						Duration (hrs)	Max. Marks	Duration in hrs	Max. Marks		
1	ECT16	Microwave Engineering	4	-	4	2	30	3	70	100	
2	ECT17	Cellular Mobile Communications	4	-	4	2	30	3	70	100	
3	ECT18	Optical Communication Networks	4	-	4	2	30	3	70	100	
4	ECT19	Embedded systems	4	-	4	2	30	3	70	100	
5		Elective-III	3	-	3	2	30	3	70	100	
6		Elective-IV	3	-	3	2	30	3	70	100	
<b>PRACTICALS</b>											
S.NO.	Course Code	Name of the Course	Instructions (hrs. per week)			Evaluation				Total Marks	
			Theory / Tutorial	Practical	Credits	Continuous Evaluation Max Marks	Internal Exam		External Exam		
							Duration (hrs)	Max. Marks	Duration in hrs		Max. Marks
7	ECP11	Optical Communication Lab	-	2	1	20	2	20	3	60	100
8	ECP12	Microwave Engineering Lab	-	2	1	20	2	20	3	60	100
<b>TOTAL</b>					<b>24</b>					<b>800</b>	

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**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**  
**IV YEAR – II SEMESTER (2016-17)**

S.NO.	Course Code	Name of the Course	Instructions (hrs per week)			Evaluation				Total Marks	
			Theory/ Tutorial	Practical	Credits	Internal Exam		External Exam			
						Duration (hrs)	Max. Marks	Duration in hrs	Max. Marks		
1	ECT20	Wireless Communication Networks	4	-	4	2	30	3	70	100	
2		Elective-V	3	-	3	2	30	3	70	100	
3		Elective- VI	3	-	3	2	30	3	70	100	
<b>PRACTICALS</b>											
S.NO.	Course Code	Name of the Course	Instructions (hrs per week)			Evaluation				Total Marks	
			Theory / Tutorial	Practical	Credits	Continuous Evaluation Max Marks	Internal Exam		External Exam		
							Duration (hrs)	Max. Marks	Duration in hrs		Max. Marks
4	ECP13	Project work	-	2	6	20	2	20	3	60	100
<b>TOTAL</b>					<b>16</b>					<b>400</b>	



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**III YEAR – II SEMESTER (2016-17)**  
**ELECTIVE-1**

S.No.	Course Code	Name of the Course	Instructions (hrs) per week)			Evaluation				Total Marks
			Theory / Tutorial	Practical	Credits	Internal Exam		External Exam		
						Duration (hrs)	Max. Marks	Duration (hrs)	Max. Marks	
1	ECT30	Electronic Measurements	3	-	3	2	30	3	70	100
2	ECT28	Micro-electromechanical systems	3	-	3	2	30	3	70	100
3	EET20	Modern Control Theory	3	-	3	2	30	3	70	100
4	EET23	Neural Networks & Fuzzy Logic	3	-	3	2	30	3	70	100
5	CSP13	Advanced Programming Lab		-	3	2	40	3	60	100

**ELECTIVE-2**

S.No.	Course Code	Name of the Course	Instructions (hrs) per week)			Evaluation				Total Marks
			Theory / Tutorial	Practical	Credits	Internal Exam		External Exam		
						Duration (hrs)	Max. Marks	Duration (hrs)	Max. Marks	
1	ECT29	Bio-Medical Instrumentation	3	-	3	2	30	3	70	100
2	CST48	Fundamentals of Database Management Systems	3	-	3	2	30	3	70	100
3	CST45	Principles of Operating Systems	3	-	3	2	30	3	70	100
4	ECT31	DSP Processor & Architecture	3	-	3	2	30	3	70	100
5	MUP01	Music (Open Elective)			4		40	3	60	100
6	MUP02	Dance- Bharathanatyam (Open Elective)			4		40	3	60	100
7	MUP03	Dance- Kuchipudi(Open Elective)			4		40	3	60	100

**III YEAR- I SEMESTER (ELECTIVE-III)**

S.No.	Course Code	Name of the Course	Instructions (hrs per week)			Evaluation				Total Marks
			Theory / Tutorial	Practical	Credits	Internal Exam		External Exam		
						Duration (hrs)	Max. Marks	Duration (hrs)	Max. Marks	
1	ECT32	Telecommunication Switching and Networks	3	-	3	2	30	3	70	100
2	MET33	Industrial Robotics	3	-	3	2	30	3	70	100
3	ECT33	Wireless Sensor Networks	3	-	3	2	30	3	70	100
4	ECT34	Satellite Communication	3	-	3	2	30	3	70	100

**IV YEAR- I SEMESTER (ELECTIVE-IV)**

S.No.	Course Code	Name of the Course	Instructions (hrs per week)			Evaluation				Total Marks
			Theory / Tutorial	Practical	Credits	Internal Exam		External Exam		
						Duration (hrs)	Max. Marks	Duration (hrs)	Max. Marks	
1	ECT35	GPS and Applications	3	-	3	2	30	3	70	100
2	CST46	OOPS through Java Programming	3	-	3	2	30	3	70	100
3	ECT36	Digital Image Processing	3	-	3	2	30	3	70	100
4	ECT37	IC Fabrication Technology	3	-	3	2	30	3	70	100

**IV YEAR- II SEMESTER (ELECTIVE-V)**

S.No.	Course Code	Name of the Course	Instructions (hrs) per week			Evaluation				Total Marks
			Theory / Tutorial	Practical	Credits	Internal Exam		External Exam		
						Duration (hrs)	Max. Marks	Duration (hrs)	Max. Marks	
1	<b>ECT38</b>	Opto Electronics	3	-	3	2	30	3	70	<b>100</b>
2	<b>ECT39</b>	Spread Spectrum Communications	3	-	3	2	30	3	70	<b>100</b>
3	<b>CST51</b>	Fundamentals of Cryptography and Network Security	3	-	3	2	30	3	70	<b>100</b>
4	<b>ECT40</b>	Pattern Recognition	3	-	3	2	30	3	70	<b>100</b>

**IV YEAR- II SEMESTER (ELECTIVE-VI)**

S.No.	Course Code	Name of the Course	Instructions ((hrs) per week)			Evaluation				Total Marks
			Theory / Tutorial	Practical	Credits	Internal Exam		External Exam		
						Duration (hrs)	Max. Marks	Duration (hrs)	Max. Marks	
1	<b>ECT41</b>	Radar Engineering	3	-	3	2	30	3	70	<b>100</b>
2	<b>ECT42</b>	Telecommunication Modelling & Simulation	3	-	3	2	30	3	70	<b>100</b>
3	<b>CST49</b>	Fundamentals of Computer Graphics	3	-	3	2	30	3	70	<b>100</b>
4	<b>CST41</b>	Multimedia Systems	3	-	3	2	30	3	70	<b>100</b>

## **SYLLABUS**

**B.Tech**  
**I Year I Semester**

**B.Tech**  
**I Year I Semester**

<b>S.No</b>	<b>Course Code</b>	<b>Course Title</b>
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**

**Sessional Marks: 30**

**University Exam Marks: 70**

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### 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.

### UNIT – 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.

### UNIT – 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**

**Sessional Marks: 30**

**University Exam Marks: 70**

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### 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.

### UNIT – 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 Kresyng, Wiley Eastern Ltd., New Delhi.
4. Engineering Mathematics, 6<sup>th</sup> Edition, B.V. Ramana, Tata McGraw Hill, New Delhi

## BST05 ENGINEERING PHYSICS

Credits – 4  
L: T: P::4: 0:0

Sessional Marks: 30  
University Exam Marks: 70

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### 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 properties-synthesis 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.Murugesan, 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**

**Sessional Marks: 30**

**University Exam Marks: 70**

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### **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

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### 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.

### 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:-** Involute 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
2. Engineering Drawing, N.S Patha sarathy, vela murali, Oxford University Press,2015
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**

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**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**

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### **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. Rigidity 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

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### 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  
$$e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} + \dots$$
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**

<b>S.No</b>	<b>Course Code</b>	<b>Course Title</b>
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

Credits – 4

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

Sessional Marks: 30

University Exam Marks: 70

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### 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, (vi) 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.
2. Canter, L.W., "Handbook of Environmental Impact Assessment Vol.I and II", The World Bank, Washington, 1991.
3. Pelczar, 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 Limited, New Delhi – 1996.

4. METCALF & EDDY, INC. "Wastewater Engineering Treatment Disposal, and Reuse", Third Edition, Taya McGraw Hill Publishing Company Limited, New Delhi-1995.
5. CSSEY.I.J. 'Unit Treatment processes in and Waste water Engineering', John Wiley & Sons England 1993.

## BST06 ENGINEERING MATHEMATICS – II

Credits – 4

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

Sessional Marks: 30

University Exam Marks: 70

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### 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.

### UNIT – 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.

### UNIT – 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 Kresyng, Wiley Eastern Ltd., New Delhi.
4. Engineering Mathematics, 6<sup>th</sup> Edition, B.V. Ramana, Tata McGraw Hill, New Delhi.

## BST04 ENGINEERING CHEMISTRY

Credits – 4  
L: T: P::4: 0:0

Sessional Marks: 30  
University Exam Marks: 70

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### UNIT 1 :

#### WATER TREATMENT

Impurities in water, 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 ENGINEERING MATERIALS

Cement: Composition, classification, preparation, setting and Hardening and analysis of cement. Refractories: 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.Engineering 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

**Credits – 4**

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

**Sessional Marks: 30**

**University Exam Marks: 70**

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### 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.

### UNIT – 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.

### UNIT – 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

Sessional Marks: 30

University Exam Marks: 70

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### 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

### UNIT – 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.

### UNIT – 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

### UNIT – 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**

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

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### **UNIT - I**

Active and passive elements – Ideal and practical sources – Source transformation –  $V - I$  Characteristics of R,L and C elements – Kirchoffs 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.

### **UNIT – III**

Periodic waveforms – Average and effective values of different waveforms – Form 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.

### **UNIT – 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.

### **UNIT – V**

Network theorems – Superposition – Thevenin's and Norton's theorems – Millman's theorem – Reciprocity theorem – Tellegen'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 (THOMSON)
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)**

**Credits: 1**

**Internal Marks: 40  
University Examinations Marks: 60**

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**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.

## **BSP02 ENGINEERING CHEMISTRY LAB**

**Credits: 1**

**Internal Marks: 40**  
**University Examinations Marks: 60**

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### **LIST OF EXPERIMENTS (Minimum Seven are Mandatory)**

1. To determine the strength of  $\text{KMnO}_4$  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. Conductometric 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

Credits: 1

Internal Marks: 40  
University Examinations Marks: 60

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### 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

## **BST07 - MATHEMATICS – III**

**Credits: 4**

**Internal Marks: 30**  
**External Marks: 70**

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### **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.

### **UNIT – IV**

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

### **UNIT – 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 Kresyizing, Advanced Engineering Mathematics.
5. B.V.Ramana Engineering Mathematics – Tata McGrawHill.



## **EET18- ELECTRICAL TECHNOLOGY**

**Credits: 4**

**Internal Marks: 30**  
**External Marks: 70**

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### **UNIT – I**

DC Machines: Principle of operation of DC generator EMF equations, Types of generators, DC motor, torque equation, Types and characteristics of motors, three point starter for shunt motor, Efficiency and speed control of shunt motor.

### **UNIT – II**

Transformers : Principles of operation of single phase transformer, Constructional features, emf equation, Phasor diagram on no-load and equivalent circuit, Losses and efficiency, Regulation, OC and SC tests, Predetermination of efficiency and regulation.

### **UNIT – III**

Three phase induction motors: Principle of operation of three phase induction motors, Slip ring and squirrel cage motors, Slip-torque characteristics, Efficiency calculations, starting methods.

### **UNIT IV**

Alternators: Principle operation, Constructional features, types : EMF equation, Distribution and coil span factors, Predetermination of regulation by synchronous impedance method.

### **UNIT – V**

Single phase motors: Principle of operation, Shaded pole motors, Capacitor motors. AC servomotor, Synchronous, Stepper motor.

Electrical instrument: Basic principle of indicating instruments, Moving coil and Moving iron instruments as ammeter and voltmeter.

### **TEXT BOOKS**

1. Electrical Technology by Edward Hughes, Pearson education.
2. Electrical Technology by B. L. Thereja.
3. Introduction to Electrical Engineering by M.S. Naidu and S. Kamkshaiah, TMH.
4. Electrical Technology by Bakshi.

## ECT02- SIGNALS AND SYSTEMS

**Credits: 4**

**Internal Marks: 30**

**External Marks: 70**

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### **UNIT – I**

**Signal Analysis:** Analogy between vectors and signals, Orthogonal Signal Space, Signal approximation using Orthogonal functions, MEAN Square Error, Closed or Complete set of Orthogonal functions, Exponential and Sinusoidal Signals, Continuous and Discrete Time Signals, Discrete Time Signal representation using Complex Exponential and Sinusoidal Components Periodicity of Discrete Time using Complex Exponential Signal, Concepts of Impulse Function, Unit Step Function, Signum Function. Properties of Fourier Transforms Involving Impulse Function and Signum Function. Introduction to Hilbert Transform.

### **UNIT – II**

**Signal Transmission through Linear Systems:** Discrete Time Signals and Sequences, Linear Shift Invariant Systems (LTI), Stability and Causality, Linear Constant Coefficient Difference Equations. Frequency Domain Representation of Discrete Time Signals and Systems Linear System, Impulse Response, Response of Linear System, Linear Time Variant (LTV) system, Transfer function of a LTI system. Filter Characteristics of Linear Systems. Distortion less Transmission through a system, Signal Bandwidth, System Bandwidth, Ideal LPF, HPF AND BPF Characteristics, Causality and Poly- Wiener Criterion for Physical Realization, Relationship between Bandwidth and Rise Time.

### **UNIT – III**

**Convolution and Correlation of Signals:** Concept of Convolution in Time Domain and Frequency Domain, Graphical Representation of Convolution, Convolution Property of Fourier Transforms. Cross Correlation and Auto Correlation of Functions, Properties of Correlation Function, Energy Density Spectrum, Parseval's Theorem, Power Density Spectrum, Relation between Auto Correlation Function and Energy/Power Spectral Density Function. Relation between Convolution and Correlation, Detection of Periodic Signals in the Presence of Noise by Correlation, Extraction of signal from Noise by Filtering.

### **UNIT - IV**

**Laplace Transforms:** Review of Laplace Transforms, Partial Fraction Expansion, Inverse Laplace Transform, Concept of Region of Convergence (ROC) for Laplace Transforms, Constraints on ROC for various Classes of Signals, Properties of L.T's relation between L.T's and F.T's of a signal. Laplace transform of Certain Signals using Waveform Synthesis.

### **UNIT – V**

**Z-Transform:** Concept of Z-Transform of a Discrete Sequence. Distinction between Laplace, Fourier and Z Transforms. Region of Convergence in Z- Transform, Constraints on ROC for Various Classes of Signals, Inverse Z- Transform, Properties of Z-Transforms. Transfer Function-BIBO Stability-System Response to Standard Signals-Solution of Difference Equations with Initial Conditions.

**Text Books:**

1. Signals, Systems and Communications- B.P. Lathi, BS Publications, 2003.
2. Signals and Systems-A. V. Oppenheim, A.S. Willsky and S. H. Nawab, PHI, 2 nd Edition.

**Reference Books:**

1. Signals & Systems – Simon Haykin and Van Veen, Wiley, 2 nd Edition.
2. Network Analysis- M. E. Van Valkenburg, PHI Publicatuions, 3 rd Edition, 2000.
3. Fundamentals of Signals and Systems, Michel J. Robert, MGH International Edition, 2008.
4. Signals, Systems and Transforms – C. L. Philips, J. M. Parr and Eve A. Riskin, Pearson Education, 3 rd Edition, 2004.

## ECT03- Digital Electronics

**Credits: 4**

**Internal Marks: 30**

**External Marks: 70**

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### **UNIT - I**

**Number systems and codes:** Review of Binary, octal decimal and hexadecimal number systems and their inter conversion. 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, 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.
2. Virendra Kumar, -Digital Technology – Priciples and Application|| New Age International Publishers – 1998.

### **Reference Books:**

1. Taub and schilling, -Digital Integrated Electronics||, McGraw 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's, Vikas publishing house.

## **EET04-ELECTRO MAGNETIC THEORY**

**Credits: 4**

**Internal Marks: 30**  
**External Marks: 70**

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### **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 constant and Dielectric strength - Energy stored in capacitor – Energy density.

### **UNIT – III**

**STEADY ELECTRO-MAGNETIC 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 free space – 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 edition, 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 Education, 2nd edn, 2004.
2. John D. Kraus, —Electromagnetics II McGraw Hill, 5th Edition, 1999.
3. N. Narayana Rao, Elements of Engg. Electro Magnetics, PHI, 6<sup>th</sup> Edn., 2008
4. T.V.S. Arun Murthy, —Electromagnetic Fields II, S.Chand, 2008.
5. David J Griffiths, —Introduction to Electrodynamics, PHI, 3rd edn, 2008.

## ECT04- ELECTRONIC CIRCUITS

**Credits: 3**

**Internal Marks: 30**

**External Marks: 70**

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### **UNIT-I**

**Rectifiers:** Diode equivalent circuits, Analysis of diode circuits, Characteristics and comparison of Half-wave, 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  $f_B$  and  $f_T$ .

### **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||, McGraw 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

## **ECP01-ELECTRONIC DEVICES LAB**

**Credits: 1**

**Internal Marks: 40**

**External Marks: 60**

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1. Study of CRO
2. PN Junction Diode Characteristics
3. ZENER Diode Characteristics
4. Half Wave Rectifier
5. Full Wave Rectifier
6. CE input and output Characteristics
7. CB input and output Characteristics
8. CC input and output Characteristics
9. FET Characteristics
10. SCR Characteristics
11. UJT Characteristics
12. LED
13. Photo Diode
14. LDR

Note: About 10 experiments have to be conducted.

## **ECP02-ELECTRICAL CIRCUITS AND DIGITAL ELECTRONICS LAB**

**Credits: 1**

**Internal Marks: 40**  
**External Marks: 60**

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1. Verification KVL and KCL in a series & Parallel resistive network.
2. Determination of coefficient of coupling of a coupled circuit.
3. Current locus diagram of a series RL and RC circuits with R varying and C varying.
4. Determination of resonant frequency, bandwidth, quality factor for RLC series circuit.
5. Verification of superposition and Reciprocity theorems.
6. Verification of maximum power transfer theorem with DC and AC sources on resistive and reactive networks.
7. Determination of Thevenin's and Norton's equivalent circuits of a bridge circuit and verification by direct test.
8. Logic gates and simulation of gates using universal gates.
9. Flip – flops.
10. Counters.
11. Shift register and Johnson Counter.
12. Decoders and Encoders.
13. Multiplexers and Demultiplexers.
14. Binary adders.

Note: About 10 experiments have to be conducted.



## **ECP03- ELECTRONIC CIRCUITS LAB**

**Credits: 1**

**Continuous Evaluation: 20**

**Internal Marks: 20**

**External Marks: 60**

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1. Half-wave rectifier and C filter.
  2. Full-wave rectifier with LC or CLC filter.
  3. Common-Emitter amplifier.
  4. Common-Base amplifier.
  5. Emitter follower and foot strapping
  6. Two stage RC coupled amplifier.
  7. Feedback amplifiers (Voltage shunt and current series)
  8. Power amplifier.
  9. RC Phase shift oscillator.
  10. Colpitts or Hartley oscillator.
  11. JFET common-source amplifier.
  12. Bridge rectifier.
  13. Measurement of  $f_r$  of a transistor

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

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

**Credits: 4**

**Internal Marks: 30**

**External Marks: 70**

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### **UNIT – I**

**INTRODUCTION TO MANAGERIAL ECONOMICS:** Management Economics: Definition, Nature and scope. **DEMAND ANALYSIS:** Law of Demand, Demand Determinants. **ELASTICITY OF DEMAND:** 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 ANALYSIS:** 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 Organisation:** 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 & Private sector companies

### **UNIT – 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.

### **UNIT – 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.

## ECT05-ANALOG COMMUNICATION

**Credits: 4**

**Internal Marks: 30**

**External Marks: 70**

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### **UNIT – I**

Elements of Electrical communication systems – Modulation and its needs and types – Fundamental physical limitations – Electromagnetic spectrum and Areas of Applications. Amplitude modulation – Full Am, DSBSC and SSB – Generation and detection methods – VSB – Frequency translation – FDM – Nonlinear distortion and inter modulation.

### **UNIT – II**

Angle modulation – Phase and frequency modulation – NBFM – WBFM – Multitone FM – Transmission Bandwidth of FM – Direct and indirect generation of FM – Demodulation methods – Nonlinear effects – FM Versus Am.

### **UNIT – III**

Block diagram study of Radio Broadcast AM and FM transmitters Superheterodyne Receivers – Choice of IFAGC – Tracking – Characteristic of Radio Receivers – FM stereo.

### **UNIT – IV**

Noise – External and internal sources of Noise – Noise calculations – Noise equivalent resistance – Noise figure – Noise temperature Effects of noise in AM and FM modulation systems – FM threshold effect – preemphasis and deemphasis.

### **UNIT – V**

Pulse analog modulation – Sampling theorem – Nyquist rate – Aliasing effect – Sampling of PDM and PPM – Generation and Detection – Spectra – Synchronization.

### **TEXT BOOKS:**

1. –Communication Systems' Simon Haykin Wiley Eastern 1978.
2. –Principle of Communication Systems|| Taub and Schilling McGraw Hill ISE 1971..
3. –Electronic Communication Systems||Kennedy and Davis 4<sup>th</sup> edition McGraw Hill International edition 1992.
4. –Communication Systems|| A. Bruce carison McGraw Hill ISE 1975.
5. –Electronic Communications|| Dennis Roddy and John Coolen Prentice – Hall of India private limited 1981.

## **ECT06: PROBABILITY THEORY AND RANDOM PROCESS**

**Credits : 4**

**Internal Marks: 30**  
**External Marks: 70**

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### **UNIT – I**

**Probability:** Probability introduced through Sets and Relative Frequency: Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Mathematical Model of Experiments, Probability as a Relative Frequency, Joint Probability, Conditional Probability, Total Probability, Bays' Theorem, Independent Events.

**The Random Variable :** Definition of a Random Variable, Conditions for a Function to be a Random Variable, Discrete and Continuous, Mixed Random Variable, Distribution and Density functions, Properties, Binomial, Poisson, Uniform, Gaussian, Exponential, Raleigh, Conditional Distribution, Methods of defining Conditioning Event, Conditional Density, Properties.

### **UNIT – II**

**Multiple Random Variables :** Vector Random Variables, Joint Distribution Function, Properties of Joint Distribution, Marginal Distribution Functions, Conditional Distribution and Density – Point Conditioning, Conditional Distribution and Density – Interval conditioning, Statistical Independence, Sum of Two Random Variables, Sum of Several Random Variables, Central Limit Theorem, (Proof not expected). Unequal Distribution, Equal Distributions.

**Operations on Multiple Random Variables:** Expected Value of a Function of Random Variables, Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions and Joint Gaussian Random Variables: Two Random Variables case, N Random Variable case, Properties, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.

### **UNIT – III**

**Random Processes – Temporal Characteristics:** The Random Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, concept of Stationarity and Statistical Independence. First-Order Stationary Processes, Second- Order and Wide-Sense Stationarity, (N-Order) and Strict-Sense Stationarity, Time Averages and Ergodicity, Mean-Ergodic Processes, Correlation-Ergodic Processes, Autocorrelation Function & Its Properties, Cross-Correlation Function & its Properties, Covariance Functions, Gaussian Random Processes, Poisson Random Process.

### **UNIT – IV**

**Random Processes – Spectral Characteristics:** The Power Spectrum: Properties, Relationship between Power Spectrum and Autocorrelation Function, The Cross-Power Density Spectrum, Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function.

### **UNIT – V**

**Linear Systems with Random Inputs:** Random Signal Response of Linear Systems: System Response – Convolution, Mean and Mean-squared Value of System Response, autocorrelation Function of Response, Cross-Correlation Functions of Input and Output,

Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Density Spectrums of Input and Output, Band pass, Band-Limited and Narrowband Processes, Properties.

**TEXT BOOKS:**

1. Probability, Random Variables & Random Signal Principles - Peyton Z. Peebles, TMH, 4th Edition, 2001.
2. Probability, Random Variables and Stochastic Processes – Athanasios Papoulis and S. Unnikrishna Pillai, PHI, 4th Edition, 2002

**Reference Books:**

1. Communication Systems Analog & Digital – R.P. Singh and S.D. Sapre, TMH, 1995.
2. Probability and Random Processes with Application to Signal Processing – Henry Stark and John W. Woods, Pearson Education, 3rd Edition.
3. Probability Methods of Signal and System Analysis. George R. Cooper, Clive D. MC Gillem, Oxford, 3rd Edition, 1999.
4. Statistical Theory of Communication - S.P. Eugene Xavier, New Age Publications, 2003.
5. Signals, Systems & Communications - B.P. Lathi, B.S. Publications, 2003.

## EET07- CONTROL SYSTEMS

**Credits: 4**

**Internal Marks: 30**

**External Marks: 70**

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### **UNIT I: INTRODUCTION**

Introduction to control systems – Control theory concepts - Open loop and feedback control systems – Mathematics modeling 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.

### **UNIT IV: SYSTEM STABILITY**

Stability concepts – Conditions for stability – Routh, Hurwitz stability criteria – Relative stability analysis - Stability in frequency domain – SyQuest stability criterion – Relative stability analysis – Gain margin – Phase margin – Frequency response specification – Constant M circles – Constant N circles – Nichol's chart.

### **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", person Education,4th edition,2004.

### **REFERENCE BOOKS**

1. Norman S. Nise, Control System Engineering, 4<sup>th</sup>Edn, Wiley Student Edn, 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.

## **ECT07- ANALOG IC APPLICATIONS**

**Credits: 4**

**Internal Marks: 30**

**External Marks: 70**

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### **UNIT – I**

**Operational Amplifier :** Ideal op-amp characteristics, Internal circuit, Differential amplifier and its transfer characteristic, Examples of IC op-amps, DC and AC characteristic, Inverting and non-inverting models of operation, Voltage follower.

### **UNIT – II**

**Op-Amp applications:** Summer, Integrator, Differentiator, Analog computations, DC and AC amplifiers Instrumentation amplifier, V to I and I to V converters, Precision rectifiers, Log and Antilog amplifiers, Multiplier.

### **UNIT – III**

**Comparators and waveform generators :** Comparator, Regenerative comparator, a stable and monostable multi vibrators using op-amp, Traingular wave generator, Sine wave generators using op-amp, IC wave form generator (8038), Voltage controlled oscillator (566)

### **UNIT – IV**

**Phase Locked Loops:** Basic Principles, Lock and capture range, IC PLL (565), PLL applications. Voltage regulators: Series op-amp regulator, IC Voltage regulators, 723 regulator, Switching regulators.

### **UNIT – V**

**Active Filters:** Low pass, High pass and Band pass filters, State variable filters, universal active filter IC.

### **TEXT BOOKS:**

1. D. Roy Choudary, Shail B. Jain, —linear Integrated circuits||. New Age International Publishers, 2003
2. David A. Bell, — Operational Amplifiers and Linear ICs||, PHI, India,

### **References:**

- 1 J. Michael Jacob, -Applications and Design with Analog integrated circuits||, PHI, EEE, 1993.
- 2 Ramakant A. Gayakwad, -Op-amps and Linear Integrated Circuits||, LPE 4<sup>th</sup> edition, Pearson Education.

## **ECT08- EM WAVES AND TRANSMISSION LINES**

**Credits: 4**

**Internal Marks: 30**

**External Marks: 70**

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### **UNIT – I**

**Waves in lossless and lossy media :** Uniform plane waves in lossless media – Phase velocity, Group velocity, Wavelength, Phase constant, Refractive index, and intrinsic impedance, Wave propagation in lossy media – wave equation, and its solution, propagation constant, conductors and dielectrics, Skin effect, and impedance, pointing vector – Instantaneous and average pointing vectors.

### **UNIT – II**

**Polarization, Reflection and Refraction :** Polarization-Linear, Circular and Elliptical polarizations. Normal incidence on plane boundaries – Reflection and transmission coefficients, Standing waves and VSWR, Oblique incidence on plane boundaries – Reflection and transmission coefficients, Standing waves and VSWR, Oblique incidence on plane boundaries – Parallel and perpendicular polarizations, Snell's law, total internal reflection, Brewster angle.

### **UNIT – III**

**Transmission Lines :** Primary constants of the line. Distributed parameter equivalent circuit. Transmission line equations and solutions, Propagation constant, Characteristic impedance. Distortionless line. Power flow. Reflection coefficient. Standing waves and standing wave ratio.

### **UNIT – IV**

**Impedance matching :** Line impedance, Input impedance of open and short circuited lines. Smith chart impedance matching (using Smith chart) – Quarter wave transformer, Single stub tuner and double tuner.

### **UNIT – V**

**Waves between parallel planes:** Transverse electric waves-Transverse magnetic waves-characteristic of TE and TM waves-TEM waves. Velocity of propagation-Attenuation in parallel plane guides-Wave impedance Rectangular wave guides: TE waves and TM waves in Rectangular waveguides-Dominant mode-cutoff frequency in wave guides-Impossibility of TEM waves in waveguides. Circular waveguides: Wave impedance and characteristic impedance-Power flow in wave guides - Attenuation factor and Q of wave guides-Transmission line analogy for wave guide

### **TEXT BOOKS :**

- 1.E.C. Jordan and K.G. Balmain, Electromagnetic Waves and Radiating Systems, PHI
- 2.C.R. Paul and S.A. Nasar, -Introduction to Electromagnetic Fields, Mc Graw Hill book company (II and III)
- 3.S.Y. Liao, -Microwave Devices and Circuits, PHI.



## **ECP04-ANALOG COMMUNICATION LAB**

**Credits: 1**

**Continuous Evaluation: 20**

**Internal Marks: 20**

**External Marks: 60**

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### **List of Experiments:**

1. Amplitude modulation and demodulation.
2. Diode detector characteristics.
3. Frequency modulation and demodulation/
4. Balanced modulator.
5. Pre-emphasis & de-emphasis
6. Characteristics of mixer.
7. Digital Phase detector.
8. Phase locked loop.
9. Synchronous detector.
10. SSB system.
11. Spectral analysis of AM & FM signals using spectrum analyzer.
12. Squelch Circuit.
13. Frequency Synthesiser.
14. AGC Characteristic.

**Note:** A minimum of 10 experiments should be conducted.

## **ECP05-IC APPLICATIONS LAB**

**Credits: 1**

**Continuous Evaluation: 20**

**Internal Marks: 20**

**External Marks: 60**

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### **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 I SEMESTER**

### **BST10: MANAGEMENT SCIENCE**

**Credits: 3**

**Internal Marks: 30**

**External Marks: 70**

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#### **UNIT – I**

**INTRODUCTION TO MANAGEMENT:** Concept of Management and organisation – Functions of Management – Evaluation of Management Thought: Taylor’s Scientific Management, Fayol’s principles of Management, Douglas MC Greg or’s theory X and Y, Maslow’s Hierarchy of human needs – Principles of Organisation – Types of Organisation  
**TYPES OF ORGANISATIONAL STRUCTURE:** Line Organisation, Functional Organisation and Line and Staff Organisation.

#### **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 entrepreneurs, entrepreneur Vs Entrepreneurship 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, Principles of Management, MC Graw Hill
2. Phillip Kotler, Marketing Management Prentice Hall of India.
3. Gary Dessler, Human Resource Management, Pearson Education, Asis.
4. L.S. Srinath, PERT/CPM, Affiliated East-West Press, New Delhi.

**REFERENCE BOOKS:**

1. W. Glueck& L.R. Jauch, Business Policy and Strategic Management, MC Graw Hill.  
Aryasri , Management Science for JNTU (B.Tech ), tmh
2. O.P. Khanna, Industrial Engineering & Management, DhanpatRai
3. Chandra Bose, Management and Administration, Prentice Hall
4. S.S.Khanka, Entrepreneurial Development, S Chand & Company Ltd., New Delhi.

## **ECT09: MICROPROCESSORS AND INTERFACING**

**Credits: 4**

**Internal Marks: 30**  
**University Exams. Marks: 70**

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### **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.

### **UNIT – 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.

### **UNIT – 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.

### **UNIT – 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, Prentice Hall, 2006.
2. Microprocessors and interfacing by Douglas V. Hall, Tata Mc Graw-Hill, 1986.
3. The intel microprocessors by Barry B. Brey & C.R. Sarma, Prentice Hall, 2012.

### **REFERENCE BOOKS:**

1. Advanced Microprocessor and Peripherals – A.K.Ray and K.M.Bhurchandi 2<sup>nd</sup> edition, TMH-2000
2. Microprocessors Interfacing- Douglas V.Hall 2<sup>nd</sup> edition, 2007
3. Microprocessors Architecture, programming, interfacing and system Design- Rajkamal, Pearson Education, 2005.

# ECT10: DIGITAL SIGNAL PROCESSING

Credits: 4

Internal Marks: 30  
University Exams. Marks: 70

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## UNIT – I

### **DISCRETE FOURIER TRANSFORMS:**

Introduction, Computation of DFT, Properties of DFT, introduction to Fourier series, DTFT, The Goertzel 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, Nyquist Filters.

## UNIT - V

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

### **TEXT BOOKS:**

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

### **REFERENCE BOOKS:**

1. Digital Signal Processing, Principles, Algorithms and Applications: John Provakis, Dimitris, G. manolakis, Pearson education/PHI 4<sup>th</sup> edition 2007.
2. Digital signal processing-A.V. Oppenheim & R W Schaffer, 2<sup>nd</sup> edition, PHI.
3. Digital Signal Processing, a computer base approach- Sanjit K. Mitra, Tata MC Graw Hill 3<sup>rd</sup> edition 2009.
4. Digital Signal Processing- Andreas Antoniou, Tata MC Graw Hill 2006.

## **ECT11: ANTENNAS AND WAVE PROPAGATION**

**Credits: 4**

**Internal Marks: 30**  
**University Exams. Marks: 70**

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### **UNIT – I**

**RADIATION FUNDAMENTALS :** Definition of an antenna, Retarded potential, Relation between potentials and time varying fields, Far field approximation, Radiation from a current elements, Antenna parameters – Radiation pattern, Radiation intensity, Directivity, Gain, HPBW, effective aperture, relation between directivity and maximum effective aperture.

### **UNIT – II**

**LINEAR WIRE ANTENNAS AND ARRAYS:** Current distribution on thin linear wire antennas. Half-wave dipole and quarter-wave monopole. Array of two point sources. Principles of pattern multiplication. Uniform linear arrays, Broad side and end fire cases.

### **UNIT – III**

**ANTENNA TYPES:** Long wire, V and Rhombic antennas, Folded dipole, Yagi-Uda array, Log-periodic dipole array, Helical antenna, Parabolic Reflector, Horn Antenna, Lens Antenna.

### **UNIT – IV**

**SURFACE WAVE AND SPACE WAVE PROPAGATION:** Friis transmission formula. Salient features of Sommerfeld's theory. Ground wave field strength calculation. Antennas located over a flat earth. Effect of curvature of earth. Refraction of radio waves in troposphere. Effective radius of earth. Radio horizon and maximum, radio range.

### **UNIT – V**

**SKY WAVE PROPAGATION:** Structures of Ionosphere. Mechanism of wave reflection in ionosphere. Critical frequency, MUF, Virtual height, Skip distance, Effect of earth's magnetic fields. Faraday rotation.

#### **TEXT BOOKS:**

1. C.A. Balanis, –Antenna Theory, Jhon Wiley & Sons, Publisher, 1982.
2. J. Griffiths, —Radio wave propagation and Antennal, Prentice hall International .1987.

#### **REFERENCE BOOKS:**

1. –Antenna and Wave Propagation, K. D. Prasad, SatyaPrakashan, Tech India Publications, New Delhi, 2001.
2. –Transmission and Propagation, E.V. D. Glazier and H. R. L. Lamont, The Serices Text book of Radio, Volume 5, Standard Publishers Distributors, Delhi.
3. Antenna Theory – C A Balanis, John Willey & Sons 2<sup>nd</sup> edition 2001.
4. Antenna and wave propagation – Kamal kishore, I.K.international Publishing House Pvt.Ltd, 2010.

## ECT12: DIGITAL COMMUNICATION

Credits: 4

Internal Marks: 30  
University Exams. Marks: 70

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### UNIT – I

**PULSE DIGITAL MODULATION:** Elements of digital communication systems, advantages of digital communication systems, Elements of PCM: Sampling, Quantization and coding, Quantization error, companding in PCM systems. Differential PCM System (DPCM).  
**DELTA MODULATION:** Delta Modulation, its drawbacks, adaptive delta modulation, comparison of PCM, DM, ADM and DPCM systems, noise in PCM and DM systems.

### UNIT – II

**DIGITAL MODULATION TECHNIQUES :** Introduction, BPSK, DPSK, DEPSK, QPSK, M-ary PSK, QAM, BFSK, BPSK, M-ary, FSK, MSK, Duobinary Encoding, Comparison of FM Systems, Partial response signalling.

### UNIT – III

**DATA TRANSMISSION:** Base band signal receiver, Inter Symbol Interference and Pulse Shaping, probability of error, the optimum filter, matched filter, probability of error; using matched filter, coherent reception, non-coherent detection of FSK calculation of error probability of ASK BPSK, BFSK and QPSK.

### UNIT – IV

**INFORMATION THEORY :** Discrete messages, The concept of amount of information, Entropy, information rate, Coding to increase average information per bit, Shannon's theorem, Channel Capacity, Capacity of Gaussian channel, Bandwidth S/N Tradeoff, Use of orthogonal signal to attain Shannon's limit, Efficiency of orthogonal signal transmission.

### UNIT – V

**BLOCK CODES:** Introduction, Matrix description of Linear Block codes, Error detection and error correction capabilities of Linear block codes, Hamming cyclic codes, Algebraic structure, encoding syndrome calculation, BCH codes.

**CONVOLUTION CODES:** Introduction, encoding of convolution codes, time domain approach, transform domain approach, Graphical approach: state, tree and trellis diagram decoding using Viterbi algorithm.

### **TEXT BOOKS:**

1. Digital Communication by Simon Haykin, John Wiley and Sons, 1988.
2. Principles of Communication Systems by Herbert Taub & Donald Schilling, Tata McGraw-Hill, 2<sup>nd</sup> Edition

### **REFERENCE BOOKS:**

1. Digital Communication by Proakis, Tata McGraw-Hill, 1995.
2. Simon Haykin —Communication Systems, John Wiley – India 3<sup>rd</sup> edition, 2010.
3. Sam Shanmugam —Digital and Analog Communication Systems, John Wiley, 2005.



## CST08: COMPUTER ORGANIZATION

Credits: 4

Internal Marks: 30  
University Exams. Marks: 70

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### UNIT – I

**Concept of Van Neumann Machine :** Functional Units, basic operational concepts, bus structures, addressing methods and machine program sequencing, memory locations, addresses, memory and I/O operation, instruction formats and instructions sequence, addressing modes and instructions, simple input programming, pushdown stacks, subroutines.

### UNIT – II

**Register Transfer and Micro Operation:** Register transfer, Bus and Memory transfers, Arithmetic micro operations, Logic micro operations, Shift micro operation Arithmetic logic shift units.

**Basic Computer Organization and Design:** Instruction codes, Computer registers and instructions, Timing and control, Instruction cycles, Memory, Reference instructions, Input-Output and Interrupt.

### UNIT – III

**Programming the Basic Control:** Machine language, Assembly language, the assembler, Programming arithmetic and logic operations, Subroutines.

**Micro Programmed Control:** Control memory, Address sequencing, Micro program example, Design of control unit.

### UNIT – IV

**Central Processing Unit:** General register organization, Stack organization, Instruction formats, Addressing modes, Program control, RISC, Parallel processing, Pipelining, Arithmetic pipeline, Instruction pipeline.

**Input – Output Organization:** Peripheral devices, Input-Output interface Asynchronous data transfer, Modes of transfer, Priority interrupt, DMA, Input-Output processor, Serial communication.

### UNIT – V

**Memory Organization:** Memory hierarchy, Main memory, Auxiliary memory, Associative memory, Cache memory, Virtual memory, Characteristics of multiprocessor, Interconnection structures, Inter processor arbitration, Inter processor communication and synchronization and cache coherence.

#### **Text Books:**

1. Computer System Architecture – 3/E – M. Morris Mano PHI.
2. Computer Organization – V.C. Hemacher, Z.G. Vranesic and S.G. Zaky, MGH
3. Computer Organization and Architecture – 6/E – B. William Stallings – PearsonEdu.

## **ECP06: MICROPROCESSOR LAB**

**Credits: 1**

**Internal Marks: 40**  
**University Exams. Marks: 60**

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1. 16-Bit Addition
2. Sorting the n numbers in ascending & descending order.
3. Sum of squares on n numbers, sum of cubes of n numbers.
4. Arithmetic mean of n numbers.
5. Interface of switch and display.
6. Interface of ADC converter.
7. Interfacing of DAC converter.
8. Stepper motor control using microprocessor.
9. Interfacing Keyboard/Display controller.
10. Implementation of Real Time Clock.
11. Microprocessor based temperature controller.
12. Microprocessor based traffic controller.

**Note:** About 10 experiments have to be conducted. The original list may be varied by the Director subject to the availability.

## **ECP07: DIGITAL COMMUNICATION LAB**

**Credits: 1**

**Internal Marks: 40**  
**University Exams. Marks: 60**

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1. Sampling Theorem – Verification.
2. Pulse Amplitude Modulation and Demodulation.
3. Pulse Width Modulation and Demodulation.
4. Pulse Position Modulation and Demodulation.
5. Pulse Code Modulation.
6. Differential Pulse Code Modulation
7. Delta Modulation
8. Time division multiplexing.
9. Frequency Shift Keying
10. Phase Shift Keying.
11. Differential Phase Shift Keying.

**Note:** About 10 experiments have to be conducted. The original list may be varied by the Director subject to the availability.

## **ECP08: DIGITAL SIGNAL PROCESSING LAB**

**Internal Marks: 40**

**Credits: 1**

**University Exams. Marks: 60**

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1. To verify linear convolution
2. To verify the circular convolution.
3. To design FIR filter (LP/HP) using Windowing Techniques.
  - a. Using Rectangular Window.
  - b. Using triangular Window.
  - c. Using Kaiser Window.
4. To implement IIR filter (LP/HP) on DSP Processors.
5. N-point FFT algorithm.
6. MATLAB program to find frequency response of analog LP/HP Filters.
7. To compute power density spectrum of sequence.
8. To find the FFT of given 1-D signal and plot.

### **List of experiments using TMS320C5X:**

9. To verify linear convolution
10. To verify the circular convolution.
11. N-point FFT algorithm.
12. To compute power density spectrum of sequence.
13. To find the FFT of given I-D signal and plot.

## **B.TECH III YEAR II SEMESTER**

### **ECT13: DIGITAL DESIGN USING VHDL**

**Credits: 4**

**Internal Marks: 30**  
**University Exams. Marks: 70**

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#### **UNIT-I**

**Electronic data converters:** D/A converters, characteristic parameters – DAC designs, DAC ICs – Conversion errors – performance measurements.

A/D converters – characteristic parameters – ADC design ADC ICs – conversion errors – ADC testing.

#### **UNIT-II**

**The VHDL Hardware Description Language:** Design flow, program structure, types and constants, functions and procedures, libraries and packages.

**The VHDL design elements:** Structural design elements, behavioral design elements, time dimension and simulation synthesis.

#### **UNIT-III**

**Combinational Logic Design:** Decoders, encoders, three state devices, multiplexers and demultiplexers, Code Converters, EX-OR gates and parity circuits, comparators, adders & subtractors, ALUs, Combinational multipliers, VHDL models for the above ICs.

#### **UNIT-IV**

**Design Examples (using VHDL):** Barrel shifter, comparators, floating-point encoder, and dual parity encoder.

**Sequential logic Design:** Latches & flip flops, PLDs, counters, shift register and their VHDL models, Synchronous design methodology.

#### **UNIT-V**

**ROMs:** Internal Structure, 2D – decoding commercial types, timing and applications.

**Static RAMs:** Internal Structure, timing and standard SRAMs, Synchronous SRAMs.

**Dynamic RAMs:** Internal Structure, timing and standard DRAMs, Synchronous DRAMs.

#### **Text Books:**

1. Digital Design Principles & Practices - John F.Wakerly, Pearson Education, 3<sup>rd</sup> Edition, 2005.
2. VHDL Primer - J.Bhaskar, Pearson education, 3<sup>rd</sup> Edition.

#### **REFERENCE BOOKS:**

1. Digital design and Modelling with VHDL & Synthesis –K.C.Chang 1<sup>st</sup> edition.
2. The designers guide to VHDL – Peter J.A Shenden – JIM LEWIS 3<sup>rd</sup> edition.

## ECT14: MICROCONTROLLER AND INTERFACING

Credits: 4

Internal Marks: 30  
University Exams. Marks: 70

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### UNIT – I

**8051 microcontroller:** Overview of Architecture of microcontroller and advanced architecture and resources in advance, 8051 microcontroller, internal and external memories, Counters and timers, synchronous serial-cum-asynchronous serial communication, Interrupt, instruction set-basic assembly language programming, Data transfer instructions, data and bit manipulation instructions, arithmetic instructions, Instructions for Logical operations on the test among the registers, internal RAM and SFR's, Program flow control instructions, Interrupt control flow.

### UNIT – II

**Real –Time Control:** Interrupt handling structures of a MCU, Interrupt latency and interrupt deadline, Multiple source of interrupts, Enabling or disabling of interrupts, polling, priorities of interrupt, interrupt structure in Intel 8051. Timers-Programmable timers in MCU's.

### UNIT – III

**Interface Methods:** Key board interfacing, LED and array of LED's, Keyboard-cum-display controller (8279), Alphanumeric devices, Printer interfaces, Programmable instruction interface using IEEE 488 Bus, Interface with the flash memory, interfacing to high power devices specify one/two devices, Analog inputs and output interfaces, optical motor shaft encoder, industrial control, industrial process control system, prototype MCU based measuring instruments, Robotics and embedded control.

### UNIT – IV

**Real- Time Operating system:** RTOS of keil (RTX51), use of RTOS in design, software development tools for microcontrollers.

### UNIT – V

**16-Bit Microcontrollers:** Memory map in Intel 80196 family MCU system, I/O ports, Programmable timers and high speed outputs and inputs, Captures, interrupt, instruction.  
**ARM 32 Bit MCU's:** Introduction to 16/32 bit processors, Architecture and organization, ARM/THUMB programming method, ARM/THUMB instruction set and development tools.

#### **Text books:**

1. Microcontrollers architecture, programming, interfacing and organization-Raj Kamal, Pearson Education, 2005
2. The 8051 Micro controller and embedded systems-Mazidi and Mazidi, PHI, 2000.

#### **References:**

1. Microcontrollers( Theory and applications) by A.V.Deshmuk, WTMH, 2005.
2. The 8051 micro Controller and Embedded systems Vol1, Mohammad Ali Mazdi, PHI, 2000.

## ECT15: VLSI DESIGN

Credits: 4

Internal Marks: 30  
University Exams. Marks: 70

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### UNIT – I

**Fundamentals of IC Fabrication Processes :** Preparation of EGS, Crystal growing, Water preparation, Epitaxy, Oxidation, Photolithography, Diffusion, Metalization, 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|| McGraw Hill. Int. Edn (UNIT – I).
2. Wayne wolf, -Modern VLSI Design||, Pearson Education Asia (Units II to IV).
3. Douglas A. Pucnell and KarmaranEshraghian, -Basic VLSI Design||. Prentice – Hall of India Private Limited (Unit – V).
4. Introduction to VLSI design – Eugene D. Fabricus, McGraw Hill.

#### **Reference Books:**

1. Modern VLSI Design, System on chip design –Wayne Wolf – Pearson Education 3<sup>rd</sup> edition.
2. Basic VLSI design – Douglas A. Puknell&KarmaramEshraghaian – Prentice- Hall Of India Pvt.Ltd.

# **CST43: BASICS OF COMPUTER NETWORKS**

**Credits: 4**

**Internal Marks: 30**

**External Marks: 70**

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## **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.



## **ECP09: VHDL LAB**

**Credits: 1**

**Internal Marks: 40**  
**University Exams. Marks: 60**

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### **Software Platform: Xilinx**

1. Simulation of all logic gates (AND, OR, NOT, NAND, NOR, EXOR, etc.)
2. Design and development of half adder
3. Design and development of full adder
4. Design and development of half subtractor
5. Design and development of full subtractor
6. Design and development of JK Flip Flop
7. Design and development of comparator
8. Design and development of decoder
9. Design and development of encoder
10. Design and development of multiplexer
11. Design and development of demultiplexer
12. Design and development of Shift Register

**Note:** Set of Assignments using VHDL program covering all the topics discussed in the theory paper

## **ECP10: MICROCONTROLLER LAB**

**Credits: 1**

**Internal Marks: 40**  
**University Exams. Marks: 60**

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1. Programming using arithmetic, logical and bit manipulation instructions of 8051
2. Counter Design Display digits starting from 00 up to 99, incremented every second
3. Lamp Controller Switch ON a lamp through a relay and switch it OFF after say 2 minutes under p program control
4. Water Level Indicator Sense the presence or absence of water and switch ON or OFF an LED
5. DAC Interface Interface DAC to the microcontroller to generate a saw-tooth, square and triangular waveform
6. ADC Interface Interface to ADC and display the input analogue voltage to digital display of 8 LEDs
7. STEPPER MOTOR INTERFACE Interface to a Stepper motor to rotate
8. LCD Interface Interface an 16 x 2 LCD display Serial Communication Establish serial communication between two microcontrollers
9. Program and verify Timer/ Counter in 8051.
10. Program and verify Interrupt handling in 8051
11. UART Operation in 8051.
12. Communication between 8051 kit and PC.
13. Interfacing Matrix/ Keyboard to 805 1.
14. Data Transfer from Peripheral to Memory through DMA controller 8237/8257.

ELECTIVE – I

ECT30: ELECTRONIC MEASUREMENTS

Credits: 3

Internal Marks: 30  
University Exams. Marks: 70

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UNIT – I

**ELECTRONIC INSTRUMENTS:** Introduction, Amplified DC Meter, AC Voltmeter Using Rectifiers, True RMS – Responding Voltmeter, Digital Voltmeter, Component Measuring Instruments, Q Meter, Vector Impedance Meter, Vector Voltmeter, RF Power & Voltage Measurement.

UNIT – II

**OSCILLOSCOPE :** Introduction, Basic Principle, CRT Features, Block Diagram of Oscilloscope, Simple CRO, Vertical Amplifier, Horizontal Deflecting System, Triggered Pulse Circuit, Delay Line in Triggered sweep, Sync Selector for continuous Sweep CRO, Typical CRT Connections, High Frequency CRT or Traveling Wave Type CRT Dual Beam CRO, Dual Trace Oscilloscope, Electronic Switch, (VHF) Sampling Oscilloscope, Storage Oscilloscope (for VLF Signals), Digital Readout Oscilloscope, Measurement of Frequency by Lissajous Method, Spot Wheel Method, Gear Method, Checking of Diodes, Basic Measurement of Capacitance & Inductance, Oscilloscope as a Bridge Null Detector, Use of Lissajous Figure for Phase Measurement, Standard Specification of Signal Beam CRO, Probes for CRO, Attenuator, Application of Oscilloscope Delayed Sweep, Digital Storage Oscilloscope, Fiber Optic CRT Recording Oscilloscope Operating Precautions, Placing an Oscilloscope in Operation.

UNIT – III

**SIGNAL GENERATORS & WAVE ANALYZER & HARMONIC DISTORTION:** Fixed frequency AF Oscillator, Variable AF Oscilloscope, Basic Standard Signal Generator, Standard Signal Generator, Modern Laboratory Signal Generator, AF Sine & Square Wave Generator, Function Generator, Square & Pulse Generator, Random Noise Generator, Sweep Generator, TV Sweep Generator, Marker Generator, Sweep-Marker Generator, Wobblscope, Video Pattern Generator, Colour Bar Generator, Vectroscope, Beat Frequency Oscilloscope (BFO), Standard Specification of Signal Generator, Basic Wave Analyzer, Frequency Selective Wave Analyzer, Heterodyne Wave Analyzer, Harmonic Distortion Analyzer, Spectrum Analyzer, Digital Fourier Analyzer, Practical FFT Spectrum Analysis using a Waveform.

UNIT – IV

**BRIDGES & RECORDERS :** Wheatstone's Bridge, Kelvin Bridge, Practical Kelvin's Double Bridge, Bridge Controlled Circuits, Digital Readout Bridges, Microprocessor Controlled Bridges, AC Bridges, Capacitance Comparison Bridge, Inductance Comparison Bridges, Maxwell's Bridge, Hay's Bridge, Schering's Bridge, Wien's Bridge, Wagner's Earth Connection, Resonance Bridge, Types of Detector's, Precautions to be Taken When Using A Bridge.

**RECORDERS :** Strip Chart, Galvanometer Type, Null Type, Circular Chart, X – Y, Magnetic, Frequency Modulation (FM), Digital Data, Objectives & Requirements of Recording Data, Recorder Selections for Particular Applications, Recorder Specifications,

Potentiometric Recorder (Multipoint), Digital Memory Waveform Recorder, Applications of Strip Chart Recorder.

## **UNIT – V**

**TRANSDUCERS** :Electrical Transducer, Selecting a Transducer, Resistance Transducer, Resistance Position Transducer, Strain Guages, Resistance Thermometer, Thermistor, Inductive Transducer, Differential Output Transducer, Linear Variable Differential Transducers, Pressure Inductive Transducer, Capacitive Transducer, Load Cell, Piezo Electrical Transducer, Photo Transducer, Temperature Transducer, Frequency Generating Transducer, Reluctance Pulse Pick-Ups, Flow Measurement, Mechanical Flow Meter, Magnetic Flow Meters, Turbine Flow meters, Measurements of Thickness Using Beta Gauge.

### **TEXT BOOKS:**

1. Electronic Instrumentation by HS. Kalsi.
2. Modern Electronic Instrumentation & Measurement Techniques by Albert D. Helfrick & William D. Copper.

### **REFERENCE BOOKS:**

1. -Measurement systems Application and Design– Ernest O Doebelin and Dhanesh N Manik TMH 5<sup>th</sup> edition,2009.
2. Electronic Measurements and Instrumentation by K.LalKishore,Pearson Education-2005.

**UNIT-I**

**INTRODUCTION TO MICROSYSTEMS**

Overview of microelectronics manufacture and Microsystems technology. Definition - MEMS materials. Laws of scaling. The multi disciplinary nature of MEMS. Survey of materials central to micro engineering. Applications of MEMS in various industries.

**UNIT-II**

**MICRO SENSORS AND ACTUATORS**

Working principle of Microsystems - micro actuation techniques - micro sensors – types – Microactuators – types – micropump – micromotors – micro – valves – microgrippers – microaccelerometers.

**UNIT-III**

**FABRICATION PROCESS**

Substrates - single crystal silicon wafer formation – Photolithography – Ion implantation – Diffusion – Oxidation – CVD - Physical vapor deposition - Deposition epitaxy - etching process.

**UNIT-IV**

**MICRO SYSTEM MANUFACTURING**

Bulk Micro manufacturing - surface micro machining – LIGA – SLIGA - Micro system packaging materials - die level - device level - system level - packaging techniques – die preparation – surface bonding - wire bonding - sealing.

**UNIT-V**

**MICROSYSTEMS DESIGN AND PACKAGING**

Design considerations, Mechanical Design, Process design, Realization of MEMS components using intellisuite. Micro system packaging, Packing Technologies, Assembly of Microsystems, Reliability in MEMS.

**TEXT BOOKS**

1. Mohamed Gad – el – Hak, –MEMS Handbook, CRC Press, 2002.
2. Rai - Choudhury P. –MEMS and MOEMS Technology and Applications, PHI Learning Private Limited, 2009.
3. Sabrie Solomon, —Sensors Handbook, McGraw Hill, 1998.
4. Marc F Madou, –Fundamentals of Micro Fabrication, CRC Press, 2nd Edition, 2002.

**REFERENCE BOOKS:**

1. Francis E.H. Tay and Choong .W.O, –Micro fluidics and Bio mems application, IEEE Press New York, 1997.
2. Trimmer William S., Ed., –Micromechanics and MEMS, IEEE Press New York, 1997.
3. Maluf, Nadim, –An introduction to Micro electro mechanical Systems Engineering, AR Tech house, Boston 2000.
4. Julian W.Gardner, Vijay K.Varadan, Osama O. AwadelKarim, –Micro sensors MEMS and Smart Devices, John Wiley & sons Ltd., 2001.

**UNIT-I**

Review of state variable analysis, controllability and Observability. Discretisation of continuous time state equations. Solution of state difference equation, controllability and Observability tests for Digital Control Systems.

**UNIT –II**

Stability of discrete time Systems. Stability improvement by state feedback, pole placement design and observers.

**UNIT-III**

Lyapunov stability Analysis. Basic concepts, Lyapunov's first and second methods Stability definitions, Stability theorems, Lyapunov functions for linear and non-linear systems.

**UNIT-IV**

Optimal Control, parameters optimization techniques, Lagrange parameter techniques, Calculus of variation, unconstrained and constrained minimization of functional. Two point boundary value problems.

**UNIT-V**

Introduction to Fuzzy control: Fuzzy sets and linguistic variables, The fuzzy control scheme, Fuzzification and defuzzification methods, Examples, Comparison between conventional and fuzzy control. Introduction to adaptive control and variable structure control. Advanced topic on the subject: Co-ordination and integrated control of different systems in industry.

**Text Books:**

1. Digital Control And State Variable Methods 3rd Edition, M. Gopal, Tata Mcgraw –Hill (Sep-08)
2. Control Systems Engineering, I. J. Nagrath, M. Gopal, New Age International (2010)
3. Optimal Control Theory: An Introduction. Donald E. Kirk, Dover Publications , 2004.

**REFERENCE BOOKS:**

1. Digital Control Systems Second Edition, Benjamin C. Kuo , Oxford University Press (2007)
2. M. Gopal, "Modern Control System Theory", Wiley Eastern Ltd., New Delhi.
3. Fuzzy Logic: With Engineering Applications, 2Nd Ed, Timothy J. Ross, Wiley India Pvt Ltd (July 2007)

**UNIT –I**

**INTRODUCTION TO ARTIFICIAL NEURAL NETWORKS:** Introduction, Artificial Neural Networks, Historical Development of Neural Networks, Biological Neural Networks, Comparison between Brain and the Computer, Comparison between Artificial and Biological Neural Networks, Network Architecture, Setting the weights, Activation Functions, Learning Methods.

**FUNDAMENTAL MODELS OF ARTIFICIAL NEURAL NETWORKS:**

Introduction, McCulloch – pitts Neuron Model, Architecture, Learning rules, Hebbian Learning Rule, Perception Learning Rule, Delta Learning Rule (Widrow-Hoff Rule or Least Mean Square (LMS) Rule, Competitive Learning Rule, Out Star Learning Rule, Boltzmann Learning, Memory Based Learning.

**UNIT –II**

**FEED FORWARD NETWORKS:** Introduction, Single Layer Perception Architecture, Algorithm, Application Perception Architecture Procedure, Perception Algorithm for Several Output Classes, Perception Convergence Theorem, Brief Introduction to Multilayer Perception Networks, Back Propagation Network (BPN), Generalized Delta Learning Rule, Back Propagation Rule, Architecture, Training Algorithm, Selection of Parameters, Learning in Back Propagation, Application Algorithm, Local Minima and Global Minima, Merits and Demerits of Back Propagation Network, Applications, Radial Basis Function Network (RBFN), Architecture, Training Algorithm for an RBFN with Fixed Centers.

**UNIT –III**

**ADALINE AND MADALINE NETWORKS:** Introduction, Adaline Architecture, Algorithm, Applications, Madaline, Architecture, MRI Algorithm, MRII Algorithm.

**COUNTER PROPAGATION NETWORKS:** Winner Take – all learning, out star learning, Kohonen Self Organizing network, Grossberg layer Network, Full Counter Propagation Network(Full CPN), Architecture, Training phases of Full CPN, Training Algorithm, Application Procedure, Forward Only Propagation Network, Architecture, Training Algorithm, Applications, Learning Vector Quantizer (LVQ).

**UNIT-IV**

**ASSOCIATIVE MEMORY NETWORKS-I:** Types, Architecture, Continuous and Discrete Hopfield Networks, Energy Analysis, Storage and Retrieval Algorithms, Problems with Hopfield Networks.

**ASSOCIATIVE MEMORY NETWORKS-II:** Boltzmann Machine, Bidirectional Associative Memory, Adaptive Introduction of Resonance Theory Networks, Architecture, Algorithm.

**UNIT-V**

**APPLICATIONS OF NEURAL NETWORKS:** Implementation of A/D Converter using Hopfield Network, Solving Optimization problems, Solving Simultaneous Linear Equation, Solving Travelling Salesman Problems using Hopfield Networks, Application in Pattern Recognition, Image Processing.

**TEXTBOOKS:**

1. Introduction to Artificial Neural Systems-J.MZurada, Jacio publishers,3<sup>rd</sup> Edition.
2. Introduction to Neural Networks using MATLAB 6.0-S.N.Shivanandam, S.Sumati, S.N.Deepa, TMH.

**REFERENCE BOOKS:**

1. Elements of Artificial Neural Networks-KishanMehrota,ChelkuriK.Mohan and Sanjay Ranka, Penram International.
2. Artificial Neural Networks-Simon Haykin, Person Education, 2<sup>nd</sup> Edition.
3. Fundamentals of Neural Networks-Laurence Fausett, Person ,1<sup>st</sup> Edition.
4. Artificial Neural Networks-B. Yegnanarayana, PHI.



## **B.TECH III YEAR II SEMESTER**

### **ELECTIVE – II**

#### **ECT29: BIO-MEDICAL INSTRUMENTATION**

**Credits: 3**

**Internal Marks: 30**  
**University Exams. Marks: 70**

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#### **UNIT –I**

Human Cell and its Electrical characteristics neuron and impulses, Recording Electrodes – Electrode- Electrolyte interface, polarizable – Non-polarizable electrodes, body surface recording electrodes, internal electrodes, micro electrodes, electrode array and practical hints in using electrodes.

#### **UNIT –II**

Bioelectric potential and cardiovascular measurement circulatory systems of heart – ECG anatomy & function of heart abnormal cardiac rhythms – Arrhythmias – Einthoven triangle. EEG recording systems (10-20 electrode systems) Biorhythms – sleep pattern.

#### **UNIT –III**

Therapeutic and prosthetic devices, cardiac pace marker, Types – Asynchronous and Synchronous modes of operation (Demand). Asynchronous pace marker – working principle and function demand PM-Working principles – QRS triggered and atrioventricular Synchronized PM lead wires and Electrodes used. Infant incubator and Lithotripsy.

#### **UNIT –IV**

Electrical Hazards in medical instruments macro and micro shocks – devices to protect against electrical hazards – Ground fault interrupter, isolation transformer, line isolation monitor, receptacle tester, electrical safety analyzer equipment, preventive maintenance.

#### **UNIT –V**

Recent Trends: Ultrasonography – laser principle and operation of laser types of lasers – pilsed ruby laser – ND-YAG laser- Helium – Neon laser- Argon laser-CO<sub>2</sub> laser excimer laser, Semiconductor laser – Laser safety.

#### **Text Books:**

1. John G. Webber –Medical Instrumentation Applications and Design|| Jhon Wiley & Sons, 1998.
2. Seslie Cromwell, Fred J. Weibell and Esich A. Plefittes –biomedical Instrumentation and Measurements|| 9<sup>th</sup> Edition, Pearson Education,

#### **REFERENCE BOOKS:**

1. RS Khandpur –Hand book of Bio Medical Instrumentation|| Tata Mc Gram Hill.

# **CST48: FUNDAMENTALS OF DATABASE MANAGEMENT SYSTEMS**

**Credits: 3**

**Internal Marks: 30**  
**University Exams. Marks: 70**

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## **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, Jhonnans Gherke TMH, 3<sup>rd</sup> edition, 2003.
2. Database concepts by A. Silberschatz, H.F. Korth, S. Sudarshan, McGraw Hill, VI Edition 2006.

**Reference Books:**

1. C.J. Date "An introduction to database systems", 6th edition Addison Wesley.
2. Elmasri Navathe, "Fundamentals of database management Systems", Addison Wesley 2nd edition.

## **CST45: PRINCIPLES OF OPERATING SYSTEMS**

**Credits: 3**

**Internal Marks: 30**  
**University Exams. Marks: 70**

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### **UNIT – I**

**Computer Systems & Operating Systems Overview :** Overview of computer systems hardware, Instruction execution – I/O function, Interrupts, Memory hierarchy, I/O communication techniques, Operating systems, Objectives and functions, Evolution of operating systems.

**Process Description and Control:** Process states, Process description Process control, Processes and threads.

### **UNIT – II**

**Memory Management:** Memory management requirements, Loading programs into main memory, Virtual memory, Hardware and control structures OS software.

### **UNIT – III**

**Uniprocessor Scheduling :** Types of scheduling, scheduling algorithms, I/O management and disk scheduling, I/O devices, Organization of I/O functions, OS design issues, I/O buffering, Disk I/O, Disk scheduling policies.

### **UNIT – IV**

**Concurrency :** Principles of concurrency, Mutual exclusion, Software and hardware approaches, Semaphores, Monitors, Message passing, Readers / Writers problems, Principles of deadlock, Deadlock prevention, Detection and avoidance, Dining philosopher's problem.

### **UNIT – V**

**File Management and Security:** Overview of file management, File organization and access, File directions, File sharing, Record blocking, Secondary storage management.

#### **Text Books:**

1. Williams Stallings, —Operating Systems, PHI Second Edition, 1997.
2. Understanding Operating Systems – by Ida M.Flynn and Ann McIverMcHoes, Thomson, Learning.
3. Operating Systems Concepts – by Silberschatz and Galvin Jhon Wiley.

# **ECT31: DSP PROCESSOR & ARCHITECTURE**

**Credits: 3**

**Internal Marks: 30**  
**University Exams. Marks: 70**

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## **UNIT – I**

**Introduction to Digital Signal Processing:** A digital signal-processing system, The sampling process, Discrete time sequences. Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), linear time-invariant systems, Digital filters, Decimation and interpolation, Analysis and design tool for DSO systems MATLAB, DSP using MATLAB.

## **UNIT – II**

**Computational accuracy in DSP implementation:** Number formats for signals and coefficients in DSP systems, Dynamic range and precision, Source of error in DSP implementations, A/D conversion errors, DSP computational errors, D/A conversion errors, compensating filter.

**Architecture for Programmable DSP devices:** Basic Architecture features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing capabilities, Address Generation Unit, Programmability and Program Execution, Speed Issues, Features for External Interfacing.

## **UNIT – III**

**Execution control and pipelining:** Hardware looping, Interrupts, stacks, relative Branch support, Pipelining and performance, pipeline Depth, Interlocking, Branching effects, Interrupt effects, and pipeline Programming models.

## **UNIT – IV**

**Programmable Digital Signal Processor:** commercial Digital Signal processing Devices, Data Addressing Models of TMS32C54XX Processors, Memory space of TMS32C54XX Processors, Program Control, TMS32C54XX instructions and programming, On-chip Peripherals, Interrupts of TMS32C54XX Processors, pipeline Operation of TMS32C54XX Processors.

## **UNIT – V**

**Implementation of Basic DSP Algorithm:** The Q-notation, FIR Filters, IIR Filter. Interpolation Filters, Decimation Filters, PID Controller, Adaptive Filters, 2-D Signal Processing. **Implementation of FFT Algorithms:** An FFT Algorithm for DFT Computation, A Butterfly computation, Overflow and scaling, Bit-Reversed index generation, An 8-Point FFT implementation on the TMS32C54XX, Computation of the signal spectrum. **Interfacing Memory and I/O peripherals to Programmable DSP devices:** Memory space Organization, External bus interfacing signals, Memory interface, Parallel I/O interface, Programmed I/O, Interrupts and I/O, Direct Memory access (DMA), A multichannel buffered serial port (MCBSP), MCBSP programming, a CODEC interface circuit, CODEC programming, a CODEC-DSP interface example.

**TEXT BOOKS:**

1. Digital Signal Processing, Avtar Singh and S.Srinivasan, Thomson Publication,2004.
2. Digital Processor Fundamentals, Architecture & features-Lapsley et al. S. Chand & Co, 2000.

**REFERENCE BOOKS:**

1. Digital Signal Processors, Architecture, Programming and Applications- B. VenkataRamani and M. Bhaskar, TMH, 2004.
2. Digital Signal Processing-Jonatham Stein, John Wiley, 2005.

**B.TECH IV YEAR I SEMESTER**

**ECT16: MICROWAVE ENGINEERING**

**Credits: 4**

**Internal Marks: 30**  
**University Exams. Marks: 70**

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**UNIT – I**

**MICROWAVE COMPONENTS:** Waveguides, Cavity resonators, attenuators, bends, corners, windows. Coupling probes and loops, phase shifters, rotary joints, matching elements, S-parameters - properties of network, Directional couplers, Tees, Isolators and circulators.

**UNIT – II**

**SOLID STATE MICROWAVE DEVICES:** Tunnel Diode, Gunn diode, IMPATT diode, PIN diode, Crystal diode, Schottky Barrier diode, Varactor diode and parametric amplifier, MASER, microwave transistors and FET's

**UNIT – III**

**MICROWAVE TUBES:** Klystron amplifier, Reflex klystron oscillator, Travelling wave tube amplifier and magnetron oscillator.

**UNIT – IV**

**MICROWAVE MEASUREMENTS:** Measurements of frequency, power, VSWR, Impedance, Reflection coefficient, Attenuation constant and dielectric constant, S-parameters and Q of a cavity.

**UNIT – V**

**MICS AND ANTENNAS :** Advantages of MICs, Hybrid MICs, Strip lines and microstrip lines, Monolithic MICs, Parabolic and Lens Antennas.

**TEXT BOOKS:**

1. Microwave and Radar Engineering by M. Kulkarani.
2. Microwave devices and circuits by Samuel Y. Liao.
3. Microwave devices and circuits by Annapurna Dass

**REFERENCE BOOKS:**

1. Foundations for Microwave Engineering – R.E. Colling, IEEE Press, John Wiley, 2nd edition, 2002.
2. Microwave Engineering Passive Circuits – Peter A. Rizzi, PHI, 1999.

## **ECT17: CELLULAR MOBILE COMMUNICATION**

**Credits: 4**

**Internal Marks: 30**  
**University Exams. Marks: 70**

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### **UNIT – I**

**Introduction to Cellular Mobile Systems:** Cellular system and its techniques, Performance criteria, Uniqueness of mobile radio environment, Analog and Digital cellular systems, Frequency reuse channels, channel interference, reduction factors, C/I: for a normal and omni-directional antenna system, Cell splitting, components of cellular system, Cell site antennas and Mobile antennas.

### **UNIT – II**

**Cell Coverage for Signal and Traffic:** General introduction, Obtaining the mobile point-to-point mobile, Propagation over water or flat open area, Foliage loss, Propagation in near in distance, Long distance propagation, Point to Point prediction model characteristics, Cell site antenna height and signal coverage cells, Mobile to Mobile propagation.

### **UNIT – III**

**Interference:** Introduction to channel interference, Real-time co-channel interference measurement, Design of antenna system, Diversity receiver, Types of non-co-channel interference, Interference between systems.

### **UNIT – IV**

**Frequency Management and Channel Assignment:** Frequency spectrum utilization, setup channels, Management, Traffic and Channel assignment handoff and their characteristics, Dropped call rates and their evolution.

### **UNIT – V**

**Digital Cellular System:** Digital mobile telephony, Multiple Access Systems: FDMA, TDMA, CDMA, Practical multiple access schemes, Global System for mobile (GSM), Miscellaneous mobile systems.

#### **Text Books:**

1. Lee, W. C. Y – Mobile Cellular Telecommunication – Analog and Digital Systems, McGraw Hill.
2. Rappaport, T. S., —Wireless Communications, Pearson Education, 2003.
3. Andreas. F. Molisch, -Wireless Communications, John Wiley – India, 2006.

#### **Reference Books:**

1. Principles of Mobile Communication- Gordon L. Stuber, Springer International, 2<sup>nd</sup> edition, 2001.
2. Modern Wireless Communications-Simon Haykin, Michael Moher, Pearson Education, 2005.
3. Wireless Communication Theory and Techniques, Asrar U. H. Sheikh, Springer, 2004.



# ECT18: OPTICAL COMMUNICATION NETWORKS

Credits: 4

Internal Marks: 30  
University Exams. Marks: 70

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## UNIT – I

**Introduction to Optical Communication:** Introduction, Fibre characteristics and classification, Optical Fibre Modes and Configurations, Rays, Fibre Materials.

**Fibre Losses:** Attenuation, Dispersion, Diffraction, Absorption, scattering and Bending Losses.

## UNIT – II

**Optical Source and Components:** Electro luminescence, LEDs, Structures, Quantum efficiency, Power, Modulation, Power bandwidth Product. Laser and their excitation, light source linearity, Modes, Threshold Conditions, External Quantum Efficiency, Resonant frequencies. Model, Mode Partition and reflection noise.

**Optical Fibre Connectors:** Connector types, Single mode fibre connectors, Connector return loss, Fibre Splicing-Splicing techniques, splicing single mode fibres, Fibre alignment and Joint loss-Multi mode fibre joining, Single mode fibre joints.

## UNIT – III

**Optical Detectors and Receivers:** Types of photo detectors, Photo diode and its noise, PIN photo diode, Photo transistor, Photo Darlington receiver transistor operation, Receiver performance and calculations.

## UNIT – IV

**Optical Amplifiers Networks:** Introduction, Types of optical amplifiers: semiconductor optical amplifiers, Doped fiber amplifiers, Optical Amplifier noise.

**Optical Networks:** Basic Optical networks: SONET/SDH, Broadcast-and-select WDM network, Plesiochronous Digital Hierarchy, IP optical networks.

## UNIT – V

**Optical Communication System and Applications:** Components of optical communication systems, transmitter, transmission channel, receiver, Video distribution, military applications, passive and active sensing.

### **Text Books:**

1. Optical Fiber Communications by Gred Kaiser, 3<sup>rd</sup> Edition, McGraw-Hill International edition, 2000
2. Optical Communication – Components and Systems – J.H. Franz and V.K. Jain, Narosa Publication 2000
3. Optical Fiber Communications & Applications by S C Gupta, 2<sup>nd</sup> Edition, PHI, 2005.

### **Reference Books:**

1. Optical fiber communications by John M. Senior, PHI, 2<sup>nd</sup> edition, 2002.
2. Fiber optic communications-D.K. Mynbaev, S.C. Guptha and Lowell L. Scheiner, Pearson education, 2005.
3. Fiber optic communication systems by Govind P. Agarwal, John Wiley, 3<sup>rd</sup> edition, 2004.

## **ECT19: EMBEDDED SYSTEMS**

**Credits: 4**

**Internal Marks: 30**  
**University Exams. Marks: 70**

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### **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.

### **UNIT – 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.

### **UNIT – 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 Instruments – 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.

## **ECP11: OPTICAL COMMUNICATION LAB**

**Credits: 1**

**Internal Marks: 40**  
**University Exams. Marks: 60**

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### **List of experiments:**

1. Optical Characteristics of LED
2. Optical Characteristics of LASER diode.
3. Intensity modulation of LASER output through an optical fiber.
4. Optical Frequency modulation & Demodulation using fiber optic link.
5. Optical Pulse width modulation & demodulation.
6. Optical Pulse Position modulation & demodulation
7. Optical Time division Multiplexing.
8. Optical 16 channel digital TDM generation.
9. Optical Manchester coding & decoding.
10. Optical Time division De-Multiplexing.
11. Optical PCM voice coding and codec frequency response.
12. Measurement of bit error rate.
13. Forming PC to PC communication link using optical fiber and RS- 232.

**Note:** About 10 experiments have to be conducted. The Original list may be varied by the Director subject to the availability.

## **ECP12: MICROWAVE ENGINEERING LAB**

**Credits: 1**

**Internal Marks: 40**  
**University Exams. Marks: 60**

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1. Reflex Klystron Oscillator characteristics.
2. Measurement of dielectric constant of materials and its losses.
3. Gunn Diode characteristics.
4. Directional coupler characteristics.
5. Low and High VSWR measurements.
6. Measurement of waveguide parameters.
7. Attenuation measurements.
8. Impedance measurements.
9. Antenna measurements.
10. Scattering parameters of circulator.
11. Scattering parameters of Magic Tee.

**Note:** about 10 experiments have to be conducted. The original list may be varied by the Director subject to the availability.

## **B.TECH IV YEAR I SEMESTER**

### **ELECTIVE-III**

#### **ECT32: TELECOMMUNICATION SWITCHING AND NETWORKS**

**Credits: 3**

**Internal Marks: 30**  
**University Exams. Marks: 70**

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#### **UNIT – I**

**TELEGRAPH CODES:** Line Communication, Morse Code, cable code, Five-unit Code, Hell Schreiber code, Telegraph speeds, Various telegraph code comparison. Difference between telephony and telegraphy, Essential part of telephone set.

#### **UNIT – II**

**SWITCHING SYSTEMS:** Simple telephone communication, Basics of switching systems signaling tones, stronger switching components, Step-by-Step switching Design parameters, 100-line switching systems, 1000 Blocking Exchange.

#### **UNIT – III**

**SWITCHING TECHNIQUES:** Principles of common control touch tone dial telephone, principles of crossbar switching configuration & technology, stored program control, and centralized SPC, Distributed SPC, two, three and n-stage network.

#### **UNIT – IV**

**TIME DIVISION SWITCHING TECHNIQUES :** Basic time division space switching, time division space switching time multiplexed space switching, time multiplexed time switching combination switching, network traffic load and parameters, grade of service and blocking probability.

#### **UNIT – V**

Subscriber loop systems, transmission plan, numbering plan, charging plan, switching techniques for data transmission ISDN, new services, transmission channels, user network interfaces, signaling, ISDN addressing, service characterization, ISDN Standards.

#### **TEXT BOOKS:**

1. Telecommunication Switching Systems and Network Thiagarajan Viswanathan, PHI, 2000.
2. Tomasi, Introduction to data communication and networking, Pearson education 1<sup>st</sup> edition 2007.

#### **REFERENCE BOOKS:**

1. John C Bellamy Digital Telephony, N John Willey, International student edition 3<sup>rd</sup> edition 2000.
2. Behrouz A. Forouzan, Data communications and Networking, TMH, 2<sup>nd</sup> edition, 2002.

## **MET33: INDUSTRIAL ROBOTICS**

**Credits: 3**

**Internal Marks: 30**  
**University Exams. Marks: 70**

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### **UNIT- I**

**Fundamentals of Robot** -Robot - Definition - Robot Anatomy – Co- ordinate Systems- Work Envelope Types and Classification Specifications-Pitch- Yaw- Roll- Joint Notations-Speed of Motion- Pay Load- Robot Parts and their Functions-Need for Robots-Different Applications.

### **UNIT- II**

**Robot Drive Systems and End Effectors** - Pneumatic Drives-Hydraulic Drives-Mechanical Drives-Electrical Drives-D.C. Servo Motors- Stepper Motors- A.C. Servo Motors-Salient Features- Applications and Comparison of all these Drives- End Effectors-Grippers-Mechanical Grippers- Pneumatic and Hydraulic- Grippers- Magnetic Grippers- Vacuum Grippers; Two Fingered and Three Fingered Grippers; Internal Grippers and External Grippers; Selection and Design Considerations.

### **UNIT- III**

**Sensors and Machine Vision** -Requirements of a sensor- Principles and Applications of the following types of sensors- Position sensors - Piezo Electric Sensor- LVDT- Resolvers- Optical Encoders- pneumatic Position Sensors- Range Sensors Triangulations Principles-Structured- Lighting Approach- Time of Flight- Range Finders- Laser Range Meters- Touch Sensors -binary Sensors.-Analog Sensors- Wrist Sensors- Compliance Sensors- Slip Sensors-Camera- Frame Grabber- Sensing and Digitizing Image Data Signal Conversion-  
**Image Storage**- Lighting Techniques- Image Processing and Analysis-Data Reduction-Segmentation- Feature Extraction- Object Recognition- Other Algorithms- Applications Inspection- Identification- Visual Serving and Navigation

### **UNIT- IV**

**Robot Kinematics and Robot Programming** Forward Kinematics- Inverse Kinematics and Difference; Forward Kinematics and Reverse Kinematics of manipulators with Two- Three Degrees of Freedom (in 2 Dimension)- Four Degrees of freedom (in 3 Dimension) Jacobians-Velocity and Forces-Manipulator Dynamics- Trajectory Generator- Manipulator Mechanism Design-Derivations and problems. Lead through Programming- Robot programming Languages-VAL Programming-Motion Commands- Sensor Commands- End Effector commands and simple Programs.

### **UNIT- V**

**Implementation and Robot Economics** RGV- AGV; Implementation of Robots in Industries-Variou Steps; Safety Considerations for Robot Operations - Economic Analysis of Robots.

## **TEXT BOOKS**

1. Klafter R.D.-Chmielewski T.A and Negin M.- -Robotic Engineering - An Integrated Approach||- Prentice Hall
2. Groover M.P.- -Industrial Robotics -Technology Programming and Applications||- McGraw Hill-

## **REFERENCES**

1. Craig J.J.- -Introduction to Robotics Mechanics and Control||- Pearson Education
2. Deb S.R.- -Robotics Technology and Flexible Automation|| Tata McGraw Hill Book Co
3. Koren Y.- -Robotics for Engineers"- McGraw Hill Book Co
4. Fu.K.S.-Gonzalz R.C. and Lee C.S.G.- -Robotics Control- Sensing- Vision and Intelligencel- McGraw Hill Book Co
5. Janakiraman P.A.- -Robotics and Image Processing||- Tata McGraw Hill
6. Rajput R.K.- -Robotics and Industrial Automation||-S.Chand and Company
7. Surender Kumar- -Industrial Robots and Computer Integrated Manufacturing||- Oxford and IBH Publishing Co. Pvt. Ltd

## **ECT33: WIRELESS SENSOR NETWORKS**

**Credits: 3**

**Internal Marks: 30**  
**University Exams. Marks: 70**

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### **UNIT-I**

**OVERVIEW OF WIRELESS SENSOR NETWORKS:** Key definitions of sensor networks, Advantages of sensor Networks, Unique constraints and challenges, Driving Applications, Enabling Technologies for Wireless Sensor Networks.

**ARCHITECTURES:** Single-Node Architecture - Hardware Components, Energy Consumption of Sensor Nodes, Operating Systems and Execution Environments, Network Architecture -Sensor Network Scenarios, Optimization Goals and Figures of Merit, Gateway Concepts.

### **UNIT-II**

**NETWORKING Technologies:** Physical Layer and Transceiver Design Considerations, Personal area networks (PANs), hidden node and exposed node problem, Topologies of PANs, MANETs, WANETs.

### **UNIT-III**

**MAC Protocols for Wireless Sensor Networks:** Issues in Designing a MAC protocol for Ad Hoc Wireless Networks, Design goals of a MAC Protocol for Ad Hoc Wireless Networks, Classifications of MAC Protocols, Contention - Based Protocols, Contention - Based Protocols with reservation Mechanisms, Contention – Based MAC Protocols with Scheduling Mechanisms, MAC Protocols that use Directional Antennas, Other MAC Protocols.

**ROUTING PROTOCOLS:** Introduction, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classification of Routing Protocols, Table –Driven Routing Protocols, On – Demand Routing Protocols, Hybrid Routing Protocols, Routing Protocols with Efficient Flooding Mechanisms, Hierarchical Routing Protocols, Power – Aware Routing Protocols, Proactive Routing.

### **UNIT-IV**

**TRANSPORT LAYER AND SECURITY PROTOCOLS:** Introduction, Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks, Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks, Classification of Transport Layer Solutions, TCP Over Ad Hoc Wireless Networks, Other Transport Layer Protocol for Ad Hoc Wireless Networks.

**INFRASTRUCTURE ESTABLISHMENT:** Topology Control, Clustering, Time Synchronization, Localization and Positioning, Sensor Tasking and Control.

**SECURITY IN WSNs:** Security in Ad Hoc Wireless Networks, Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Key Management, Secure Routing in Ad Hoc Wireless Networks.

### **UNIT-V**

**SENSOR NETWORK PLATFORMS AND TOOLS:** Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node-level software platforms, Node-level Simulators, State-centric programming.



**APPLICATIONS of WSN:** S Ultra wide band radio communication, Wireless fidelity systems. Future directions, Home automation, smart metering Applications.

**TEXT BOOKS:**

1. Ad Hoc Wireless Networks: Architectures and Protocols - C. Siva Ram Murthy and B.S.Manoj, 2004, PHI
2. Wireless Ad- hoc and Sensor Networks: Protocols, Performance and Control – JagannathanSarangapani, CRC Press
3. Holger Karl & Andreas Willig, -Protocols And Architectures for Wireless Sensor Networks", John Wiley, 2005.

**REFERENCES:**

- 1 .KazemSohraby, Daniel Minoli, &TaiebZnati, -Wireless Sensor Networks- Technology, Protocols, and Applicationsl, John Wiley, 2007.
- 2 Feng Zhao & Leonidas J. Guibas, -Wireless Sensor Networks- An Information Processing Approach", Elsevier, 2007.
- 3 Ad- Hoc Mobile Wireless Networks: Protocols & Systems, C.K. Toh ,1 ed. Pearson Education.
- 4 Wireless Sensor Networks - C. S. Raghavendra, Krishna M. Sivalingam, 2004, Springer.

**UNIT-I**

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

**UNIT-II**

**Programming in C:** Elements of C Tokens, Identifiers, Preprocessor Directives. Data types in C. Control Structures in C. Sequence, Selection and Iterations. Arrays, Strings, Pointers, Functions, Structures, Unions. Files I/O.

**UNIT-III**

**OO Programming Concepts & C++:** Classes, Object, Instantiation. Encapsulation, Abstraction, Inheritance, Polymorphism. C++ Programming: Elements of C++- Tokens, Identifiers. Variables and Constants, Data types, Operators, Control Statements. Functions Constructors and Destructors. Templates, Exception Handling.

**UNIT-IV**

**Java Programming:** An overview of Java, Data types, Arrays and Variables, Operators, Control Statements, Introduction of Classes, Inheritance, Packages and Interfaces, Exception Handling, Multithreaded Programming, I/O Basics, Applets.

**UNIT-V**

**Data Structures and Algorithms:** Data, Information, Definition of Data Structures. Arrays, Stacks, Queues, Linked Lists, Trees, Graphs. Searching and Sorting Techniques. Introduction to Algorithms. Analysis of Algorithms, Binary Search, Asymptotic Notations-Big O, Omega and Theta. Average Case Analysis of Simple Programs like Finding Maximum of N elements.

**Text Books:**

1. Balagurusamy E, Programming in ANSI C, 6th Edition, Tata McGraw-Hill, 2012
2. R.G.Dromey, How to Solve it by Computer, PHI.
3. Balagurusamy E , Object Oriented Programming with C++ 6th Edition, McGraw Hill Education, 2013.
4. Herbert Schildt Java : The Complete Reference, 10<sup>th</sup> Edition, McGraw Hill India, 2017
5. -Fundamental of Algorithms, E. HOROWITZ and S. SAHNI, GALGOTIA.
6. S.Sahni, -Data Structures, Algorithms and Applications in C+ +|| Second Edition, Orient Longman Pvt.ltd,2010

## **ECT34: SATELLITE COMMUNICATION**

**Credits: 3**

**Internal Marks: 30**  
**University Exams. Marks: 70**

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### **UNIT – I**

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

### **UNIT – 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.

### **UNIT – IV**

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

### **UNIT – V**

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

### **Text Books:**

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

### **REFERENCE BOOKS:**

1. N.agarwal Design of geo synchronous space craft, Prentice hall 1986.
2. Bruce R. Elbert, The satellite Communication Applications, Handbook, Artech house boston London,1997.

## **B.TECH IV YEAR I SEMESTER**

### **ELECTIVE-IV**

#### **ECT35: GPS AND APPLICATIONS**

**Credits: 3**

**Internal Marks: 30**  
**University Exams. Marks: 70**

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#### **UNIT-I**

Fundamental of Reference Systems and Frames: Geodetic and Cartesian coordinates systems. Principles of coordinate transformation, GPS reference systems WGS84, basic concept of map projections. Basic Principles of GPS Operations: Ranging from space, satellite, control and user segment, GPS satellite navigation message, GPS time, fundamental and derived frequencies.

#### **UNIT-II**

Basic Types of GPS Observable: Pseudo ranges (P-code, C/A- code), L1 and L2 phases. GPS Error Source and Error Handling Procedures: Atmospheric effects, clock and orbit errors, multipath, anti-spoofing and selective availability, etc., interface and jamming.

#### **UNIT-III**

Position determination with phases and pseudoranges: Minimum constellation and over-determined case, concept of dilution of precision (PDOP, HDOP, VDOP etc.), point positioning and differential mode, differential services, principles of ambiguity resolution, cycle slips.

#### **UNIT-IV**

User Equipment: Single vs dual frequency receivers, navigation vs geodetic quality, antenna types, primary equipment and software products. Data Collection and Procedures: Data transfer, processing and result interpretation, residual and covariance analysis, Static vs Kinematic GPS applications.

#### **UNIT-V**

GPS applications in surveying, mapping, GIS, air and land navigation and precision farming, integration with other sensors, inertial navigation (INS) and imaging sensors, GPS in intelligent transportation and fleet management, remote sensing applications in transportation.

#### **TEXT BOOKS:**

1. Surveying, F. Moffitt and J. Bossler, 10<sup>th</sup> edition, Addison Wesley Longman, Inc., 1998, Chapter 10: The Global positioning system, pp.-349-368(Optional).
2. GPS: Theory and Practice, B. Hofmann-Wellenhof, H. Lichtenegger and J. Collins, 4<sup>th</sup> Revised edition, Springer wien, New York, 1997(Optional).

#### **REFERENCE:**

1. GPS Satellite Surveying, A. Leick, 2<sup>nd</sup> edition, John Wiley & Sons, 1995.
2. GPS: Theory and applications, B. Parkison, J. Spilker Jr (Eds), Vol. I & II, L'Enfant Promenade SW, Washington, DC 2024, 1996.

# CST46: OOPS THROUGH JAVA PROGRAMMING

**Credits: 3**

**Internal Marks: 30**  
**External Marks: 70**

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## UNIT- I

**The History and Evolution of Java:** Java's Lineage, The Creation of java, how java changed the internet, Java's magic: The byte code, Servlets: java on the server side, java Buzzwords, Evolution of java.

**An Overview of Java:** Object Oriented Programming, Two control statements, Using blocks of codes, Lexical issues. The java class Libraries.

**Data Types, Arrays and Variables:** Primitive Types, Integers, Floating-point Types, Characters, Booleans, literals, variables, Type conversion and casting, Automatic Type Promotion in Expressions, Arrays, strings, Pointers.

## UNIT- II

**Operators:** Arithmetic Operators, The Bitwise Operators, Relational Operators, Boolean Logic operators, The assignment operator, The ? Operator, Operator Precedence, Using Parentheses.

**Control Statements:** Java's selection Statements, Iteration statements, Jump Statements.

**Introducing Classes:** Class Fundamentals, Declaring Objects, Assuming Object reference Variables, Introducing Methods, Constructors, The this Keyword, Garbage Collection, The Finalize() method, A Stack class. Overloading Methods, Using Object as Parameter, Argument Passing, Returning Objects, Recursion, Introducing Access control, Understanding static, Introducing Nested and Inner classes, Exploring the String class, Using Command line Arguments, Varargs: variable-Length Arguments.

## UNIT- III

**Inheritance:** Basics, Using super, creating a multi level hierarchy, when constructors are executed, method overriding, dynamic method dispatch, using abstract class, using final with inheritance, the object class.

**Packages and Interfaces:** Packages, Access protection, Importing Packages, Interfaces, Default Interfaces, Default interface methods, Use static methods in an Interface, Final thoughts on Packages and interfaces.

**Exception Handling:** Exception handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch, Multiple catch clauses, Nested try statements, throw, throws, finally, Java Built-in Exceptions, Creating your own exception subclasses, Chained Exceptions, Three Recently added Exceptions features, Using Exceptions.

## UNIT- IV

**Multithreaded Programming:** The java Thread Model, The main thread , Creating Thread, Creating Multiple Threads, Using isAlive() and join(), Thread Priorities, Synchronization, Interthread Communication, Suspending, resuming and stopping threads, Obtaining a thread state, Using Multithreading.

**I/O, Applets, and Other Topic:** I/O basics, Reading Console input, Writing console Output, The PrintWriter class, Reading and writing files, Automatically closing a file, Applet

fundamentals, enumerations type wrappers auto boxing annotations, Generics: The general form of a generics class, creating a generic method, generics interfaces.

## **UNIT- V**

**Introduction the AWT: Working with windows, graphics and Text:** AWT classes, window fundamentals, working with frame windows, creating a frame window in a an AWT Based applet, creating a window program, displaying information within a window, Graphics, working with color, setting the paint mode, working with fonts, managing text output using font metrics,.

**Using AWT controls, Layout Mangers, and Menus:** AWT control fundamentals, Labels, using buttons, applying check boxes, check box group, choice controls, using lists, Managing scroll bars, using a Text field, Using a Text area, understanding layout managers, Menu bars and Menus, dialog boxes, file dialog, Overriding paint().

## **TEXT BOOKS:**

1. Java The Complete Referencell, HerbertSchildt, MC GRAW HILL Education, 9th Edition,2016.

## **REFENCE BOOKS:**

1.-Programming with Javall T.V.Suresh Kumar, B.Eswara Reddy, P.Raghavan Pearson Edition.

2.-Java Fundamentals - A Comprehensive Introductionll, Herbert Schildt and Dale Skrien, Special Indian Edition, McGrawHill, 2013.

3.-Java – How to Programll, Paul Deitel, Harvey Deitel, PHI.

4. -Core Javall, NageswarRao, Wiley Publishers.

5.-Thinking in Javall, Bruce Eckel, Pearson Education.

6.-A Programmers Guide to Java SCJPll, Third Edition, Mughal, Rasmussen, Pearson.

-Head First Javall, Kathy Sierra, Bert Bates, O'Reilly -SCJP – Sun Certified Programmer for Java

Study guidell – Kathy Sierra, Bert Bates, McGrawHill

## **ECT36: DIGITAL IMAGE PROCESSING**

**Credits: 3**

**Internal Marks: 30**  
**University Exams. Marks: 70**

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### **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, Properties 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 sharpening, Colour image.

### **UNIT – IV**

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

### **UNIT – 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.

### **REFERENCE BOOKS:**

1. Digital Image Processing using Matlab-Rafael C Gonzalez, R.E Woods & Steven L edition, PEA,2004.
2. Digital Image Processing – William K Pratt, John Wilely 3<sup>rd</sup> edition 2004.

## **ECT37: IC FABRICATION TECHNOLOGY**

**Credits: 3**

**Internal Marks: 30**  
**University Exams. Marks: 70**

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### **UNIT-I**

**Introduction to IC Technology:** Basic fabrication steps and their Importance. Environment of IC Technology: Concepts of Clean room and safety requirements, Concepts of Wafer cleaning processes and wet chemical etching techniques.

### **UNIT-II**

**Impurity Incorporation:** Solid State diffusion modeling and technology; Ion Implantation modeling, technology and damage annealing, characterization of Impurity profiles Oxidation: Kinetics of Silicon dioxide growth both for thick, thin and ultra thin films, Oxidation technologies in VLSI and ULSI, Characterization of oxide films, High k and low k dielectrics for ULSI. Lithography: Photolithography, E-beam lithography and newer lithography techniques for VLSI/ULSI, Mask generation.

### **UNIT-III**

**Chemical Vapour Deposition Techniques:** CVD techniques for deposition of polysilicon, silicon dioxide, silicon nitride and metal films; Epitaxial growth of silicon: modeling and technology.

### **UNIT-IV**

**Metal Film Deposition:** Evaporation and sputtering techniques, Failure mechanisms in metal interconnects Multi-level metallization schemes.

### **UNIT-V**

**Plasma and Rapid Thermal Processing:** PECVD, Plasma etching and RIE techniques; RTP techniques for annealing, growth and deposition of various films for use in ULSI.

### **TEXT BOOKS:**

1. S.M.Sze(2nd Edition )||VLSI Technology||, McGraw Hill Companies Inc.
2. C.Y. Chang and S.M.Sze (Ed), -ULSI Technology||, McGraw Hill Companies Inc.

### **REFERENCES TEXT BOOKS:**

1. Stephen, Campbell, -The Science and Engineering of Microelectronic Fabrication||, Second Edition, Oxford University Press.
2. James D.Plummer, Michael D.Deal, ||Silicon VLSI Technology|| Pearson Education



## **B.TECH IV YEAR II SEMESTER**

### **ECT20: WIRELESS COMMUNICATION NETWORKS**

**Credits: 4**

**Internal Marks: 30**  
**University Exams. Marks: 70**

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#### **UNIT-I**

**The Cellular Concept-System Design Fundamentals:** Introduction, Frequency Reuse, Channel Assignment Strategies, Handoff Strategies, Interference and system capacity, Trunking and Grade of Service, Improving Coverage & Capacity in Cellular Systems.

#### **UNIT-II**

**Mobile Radio Propagation: Large-Scale Path Loss:** Introduction to Radio Wave Propagation, Free Space Propagation Model, Relating Power to Electric Field, The Three Basic Propagation Mechanisms, Reflection, Ground Reflection (Two-Ray) Model, Diffraction, Scattering, Outdoor Propagation Models, Indoor Propagation Models, Signal penetration into buildings, Ray Tracing and Site Specific Modeling.

#### **UNIT-III**

**Mobile Radio Propagation: Small —Scale Fading and Multipath:** Small Scale Multipath propagation, Impulse Response Model of a multipath channel, Small-Scale Multipath Measurements, Parameters of Mobile Multipath Channels, Types of Small- Scale Fading, Statistical Models for multipath Fading Channels

#### **UNIT –IV**

**Equalization and Diversity:** Introduction, Fundamentals of Equalization, Training A Generic Adaptive Equalizer, Equalizers in a communication Receiver, Linear Equalizers. Non linear Equalization, Algorithms for adaptive equalization, Diversity Techniques, RAKE Receiver.

#### **UNIT –V**

**Wireless Networks:** Introduction to wireless Networks, Advantages and disadvantages of Wireless Local Area Networks, WLAN Topologies, WLAN Standard IEEE 802.11, IEEE 802.11 Medium Access Control, Comparisons of IEEE 802.11 a,b,g and n standards, IEEE 802.16 and its enhancements, Wireless PANs, HiperLan, WLL.

#### **TEXT BOOKS:**

1. Wireless Communications, Principles, Practice — Theodore, S. Rappaport, 2ndEd., 2002, PHI.
2. Wireless Communications-Andrea Goldsmith, 2005 Cambridge University Press.
3. Mobile Cellular Communication — Gottapu Sasibhushana Rao, Pearson Education, 2012.

#### **REFERENCE BOOKS:**

1. Principles of Wireless Networks — Kaveh PahLaven and P. KrishnaMurthy, 2002, PE.
2. Wireless Digital Communications — Kamilo Feher, 1999, PHI.
3. Wireless Communication and Networking — William Stallings, 2003, PHI.
4. Wireless Communication — Open Dalai, Oxford Univ. Press.
5. Wireless Communications and Networking — Vijay K. Gary, Elsevier.

**B.TECH IV YEAR II SEMESTER**

**ELECTIVE-V**

**ECT38: OPTO ELECTRONICS**

**Credits: 3**

**Internal Marks: 30**  
**University Exams. Marks: 70**

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**UNIT –I**

**ELEMENTS OF LIGHT AND SOLID STATE PHYSICS:** Wave nature of light, Polarization, Interference, Diffraction, Light Source, Review of Quantum Mechanical Concept, Review of Solid State Physics, Review of Semi conductor Physics and Semiconductor Junction Device.

**UNIT –II**

**DISPLAY DEVICES AND LASERS:** Introduction, Photo Luminescence, Cathode Luminescence, Electro Luminescence, Injection Luminescence, LED, Plasma Display, Liquid Crystal Displays, Numeric Displays, LASER Emission, Adsorption, Radiation, Population Inversion, Optical Feedback, Threshold Condition, LASER Modes, Classes of LASERS, Mode Locking, LASER Applications.

**UNIT –III**

**OPTICAL DETECTION DEVICES:** Photo Detector, Thermal Detector, Photo Devices, Photo Conductors, Photo Diodes, Detector Performance.

**UNIT -IV**

**OPTOELECTRONIC MODULATOR:** Introduction, Analog and Digital Modulation, Electro-Optic Modulators, Magneto Optic Devices, Acoustic Devices, Optical, Switching and Logic Devices.

**UNIT -V**

**OPTOELECTRONIC INTEGRATED CIRCUITS:** Introduction, Hybrid and Monolithic Integration, Application of Opto Electronic Integrated Circuits, Integrated Transmitters and Receivers, Guided Wave Devices.

**TEXT BOOKS:**

1. Pallab Bhattacharya — Semiconductor Opto Electronic Devices, Prentice Hall of India Pvt., Ltd., New Delhi, 2006.
2. Jasprit Singh, —Opto Electronics-As Introduction to Materials and Devices, McGraw-Hill International Edition, 1998.

**REFERENCE BOOKS:**

1. S C Gupta, Opto Electronic Devices and Ssystems, Prentice Hal of India, 2005.
2. J. Wilson and J. Haukes, —Opto Electronics-An Introduction, Prentice Hall, 1995.

## **ECT39: SPREAD SPECTRUM COMMUNICATIONS**

**Credits: 3**

**Internal Marks: 30**  
**University Exams. Marks: 70**

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### **UNIT -I**

Introduction to Spread Spectrum Systems: Fundamental Concepts of Spread Spectrum Systems, Pseudo Noise Sequences, Direct Sequence Spread Spectrum, Frequency Hop Spread Spectrum, Hybrid Direct Sequence Frequency Hop Spread Spectrum, Code Division Multiple Access. Binary Shift Register Sequences for Spread Spectrum Systems: Introduction, Definitions, Mathematical Background and Sequence Generator Fundamentals, Maximal Length Sequences, Gold Codes.

### **UNIT -II**

Code Tracking Loops: Introduction, Optimum Tracking of Wideband Signals, Base Band Delay-Lock Tracking Loop, Tau-Dither Non-Coherent Tracking Loop, Double Dither NonCoherent Tracking Loop.

### **UNIT -III**

Initial Synchronization of the Receiver Spreading Code: Introduction, Problem Definition and the Optimum Synchronizer, Serial Search Synchronization Techniques, Synchronization using a Matched Filter, Synchronization by Estimated the Received Spreading Code.

### **UNIT -IV**

Cellular Code Division Multiple Access (CDMA) Principles: Introduction, The Cellular CDMA System, Single User Receiver in a Multi User Channel, CDMA System Capacity, Multi-User Detection in CDMA Cellular Radio: Optimal Multi-User Detection, Linear Suboptimal Detectors, Interference Combat Detection Schemes, Interference Cancellation Techniques.

### **UNIT -V**

Performance of Spread Spectrum Systems in Jamming Environments: Spread Spectrum Communication System Model, Performance of Spread Spectrum Systems without Coding. Performance of Spread Spectrum Systems with Forward Error Correction: Elementary Block Coding Concepts, Optimum Decoding Rule, Calculation of Error Probability, Elementary Convolution Coding Concepts, Viterbi Algorithm, Decoding and Bit-Error Rate.

### **TEXT BOOKS:**

1. Rodger E Ziemer, Roger L. Peterson and David E Borth - -Introduction to Spread Spectrum Communication- Pearson, 1st Edition, 1995.
2. Mosa Ali Abu-Rgheff – -Introduction to CDMA Wireless Communications. || Elsevier Publications, 2008.

### **REFERENCE BOOKS:**

1. George R. Cooper, Clare D. McGillem - -Modern Communication and Spread Spectrum, || McGraw Hill, 1986.
2. Andrew j. Viterbi - -CDMA: Principles of spread spectrum communication, || Pearson Education, 1st Edition, 1995.
3. KamiloFeher - -Wireless Digital Communications, || PHI, 2009.
4. Andrew Richardson - -WCDMA Design Handbook, || Cambridge University Press, 2005. 5. Steve Lee - Spread Spectrum CDMA, McGraw Hill, 2002.

# **CST51: FUNDAMENTALS OF CRYPTOGRAPHY AND NETWORK SECURITY**

**Credits: 3**

**Internal Marks: 30  
University Exams. Marks: 70**

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## **UNIT -I**

Introduction, Mathematics of Cryptography, Traditional Symmetric-Key Ciphers, Mathematics of Symmetric-Key Cryptography.

## **UNIT-II**

Introduction to Modern Symmetric-key Ciphers, Data Encryption Standard(DES), Advanced Encryption Standard(AES), Encipherment Using Modern Symmetric-Key Ciphers.

## **UNIT-III**

Mathematics of Asymmetric key Cryptography, Asymmetric-key Cryptography, Message Integrity and Message Authentication.

## **UNIT-IV**

Cryptographic Hash Functions, Digital Signature, Entity Authentication, Key Management.

## **UNIT-V**

Security at the Application Layer: PGP and S/MIME, Security at the Transport Layer: SSL and TLS, Security at the Network Layer: IPSec, System Security.

## **Text Book:**

1. Forouzan B A, Mukhopadhyay D, Cryptography and Network Security, 2<sup>nd</sup> edition, Tata McGraw-Hill, 2010.

## **Reference Books:**

1. Stallings W, Cryptography and Network Security, 5<sup>th</sup> edition, Pearson Education, 2011.
2. Stinson D R, Cryptography Theory and Practice, 3<sup>rd</sup> edition, Chapman & Hall/CRC, 2005.
3. Paar C, Pelzl J, Understanding Cryptography, Springer, 2010.
4. Kizza J M, Guide to Computer Network Security, 2<sup>nd</sup> edition, Springer, 2013.

# **ECT40: PATTERN RECOGNITION**

**Credits: 3**

**Internal Marks: 30**  
**University Exams. Marks: 70**

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## **UNIT- I**

### **PATTERN CLASSIFIER**

Overview of pattern recognition – Discriminant functions – Supervised learning – Parametric estimation – Maximum likelihood estimation – Bayesian parameter estimation – Perceptron algorithm – LMSE algorithm – Problems with Bayes approach – Pattern classification by distance functions – Minimum distance pattern classifier.

## **UNIT- II**

### **UNSUPERVISED CLASSIFICATION**

Clustering for unsupervised learning and classification – Clustering concept – C-means algorithm – Hierarchical clustering procedures – Graph theoretic approach to pattern clustering – Validity of clustering solutions.

## **UNIT- III**

### **STRUCTURAL PATTERN RECOGNITION**

Elements of formal grammars – String generation as pattern description – Recognition of syntactic description – Parsing – Stochastic grammars and applications – Graph based structural representation.

## **UNIT- IV**

### **FEATURE EXTRACTION AND SELECTION**

Entropy minimization – Karhunen – Loeve transformation – Feature selection through functions approximation – Binary feature selection.

## **UNIT- V**

### **RECENT ADVANCES**

Neural network structures for Pattern Recognition – Neural network based Pattern associators – Unsupervised learning in neural Pattern Recognition – Self-organizing networks – Fuzzy logic – Fuzzy pattern classifiers – Pattern classification using Genetic Algorithms.

### **REFERENCES:**

1. Robert J.Schalkoff, Pattern Recognition Statistical, Structural and Neural Approaches, John Wiley & Sons Inc., New York, 1992.
2. Tou and Gonzales, Pattern Recognition Principles, Wesley Publication Company, London, 1974.
3. Duda R.O., and Har P.E., Pattern Classification and Scene Analysis, Wiley, New York, 1973.
4. Morton Nadier and Eric Smith P., Pattern Recognition Engineering, John Wiley & Sons, New York, 1993.

## **B.TECH IV YEAR II SEMESTER**

### **ELECTIVE-VI**

#### **ECT41: RADAR ENGINEERING**

**Credits: 3**

**Internal Marks: 30**  
**University Exams. Marks: 70**

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#### **UNIT – I**

Nature of Radar and Radar equation, simple form radar equation, radar block diagram and operation, Radar frequencies, application of Radar.

Minimum detectable signal – Receiver noise, Probability – Density functions, signal-to-noise ratio, Radar cross section of target, cross-section fluctuations systems losses.

#### **UNIT – II**

**Radar Components :** RF amplifier, TWT, CFA, Modulators, mixers – Conversion loss, Noise figure, Balanced mixer, Image recovery mixer, Duplexers – Branches type, Balanced type and solid state duplexers, limiters, Display – CRT displays, A,BC, d – scopes PPI and RHI.

#### **UNIT – III**

**Radar Systems :** CW radar, frequency – modulates CW radar, multiple – Frequency CW radar, MTI radar – Delay line cancelers, Pulse repetition frequencies, Range-gated doppler filters tracking radar – Range and angle tracking sequential locking and conical scanning.

#### **UNIT – IV**

**Navigational Systems:** Radio direction finding and radio ranges, the loop antenna, the goniometer, errors in direction finding the LF/MF four-course radio range, VHF –VOR, VOR receiving equipment.

#### **UNIT – V**

**Navigational Aids:** Hyperbolic systems of navigation & DME, TACAN L Ooran-a, Loran-C, the decca navigation systems, decca receivers, DMA-operation, TACAN STACAN equipment.

#### **Text Books:**

1. Introduction to radar systems – –M.I. Skolnik, 2<sup>nd</sup> edition TMH 1980.
2. Elements on electronic navigation – –N.S. Nagrajul 2<sup>nd</sup> edition 1996.

#### **Reference Books:**

1. Modern Electronic Communication – –G.M. Mikker 6<sup>th</sup> edition, Prentice Hall 1999.
2. Electronic Communication Systems – –Kennedy & Davis 4<sup>th</sup> edition TMH 1993.

**Credits: 3**

**Internal Marks: 30**  
**University Exams. Marks: 70**

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**UNIT- I**

**SIMULATION METHODOLOGY**

Introduction, Aspects of methodology, Performance Estimation, Simulation sampling frequency, Low pass equivalent simulation models for bandpass signals, Multicarrier signals, Non-linear and timevarying systems, Post processing – Basic graphical techniques and estimations.

**UNIT- II**

**RANDOM SIGNAL GENERATION & PROCESSING**

Uniform random number generation, Mapping uniform random variables to an arbitrary pdf, Correlated and Uncorrelated Gaussian random number generation, PN sequence generation, Random signal processing, Testing of random number generators.

**UNIT- III**

**MONTE CARLO SIMULATION**

Fundamental concepts, Application to communication systems, Monte Carlo integration, Semianalytic techniques, Case study: Performance estimation of a wireless system.

**UNIT- IV**

**ADVANCED MODELS & SIMULATION TECHNIQUES**

Modeling and simulation of non-linearities : Types, Memoryless non-linearities, Non-linearities with memory, Modeling and simulation of Time varying systems : Random process models, Tapped delay line model, Modelling and simulation of waveform channels, Discrete memoryless channel models, Markov model for discrete channels with memory.

**UNIT -V**

**EFFICIENT SIMULATION TECHNIQUES**

Tail extrapolation, pdf estimators, Importance Sampling methods, Case study: Simulation of a Cellular Radio System.

**TEXT BOOKS:**

1. William.H.Tranter, K. Sam Shanmugam, Theodore. S. Rappaport, Kurt L. Kosbar, Principles of Communication Systems Simulation, Pearson Education (Singapore) Pvt. Ltd, 2004.
2. M.C. Jeruchim, P.Balaban and K. Sam Shanmugam, Simulation of Communication Systems:
3. Modeling, Methodology and Techniques, Plenum Press, New York, 2001.

**REFERENCES BOOKS:**

1. Averill.M.Law and W. David Kelton, Simulation Modeling and Analysis, McGraw Hill Inc., 2000.
2. Geoffrey Gorden, System Simulation, Prentice Hall of India, 2nd Edition, 1992.
3. Jerry Banks and John S. Carson, Discrete Event System Simulation, Prentice Hall of India, 1984.

# CST49: FUNDAMENTALS OF COMPUTER GRAPHICS

Credits: 3

Internal Marks: 30  
University Exams. Marks: 70

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## UNIT – I

Introduction to computer Graphics: Basic Raster Graphics algorithms for drawing 2-D primitives.

## UNIT- II

**Geometrical transformations:** 2-D transformations, homogeneous coordinate and Matrix representation of 2-D transformations, Composition of 2-D transformations, window to viewport transformations.

Matrix representation of 3-D transformations, composition of 3-D transformation.

## UNIT – III

**Viewing in 3-D:** Projections, specifying an arbitrary 3-D view, Mathematics of planar, Geometric projections.

**Representing curves and surfaces:** polygon meshes, parametric cubic curves, parametric bicubic surfaces.

## UNIT – IV

**Solid Modelling:** Representing solids, Regularized Boolean set operations, Primitive instancing, Representations, Constructive solid Geometry.

## UNIT – V

**Visible surface determination:** Functions of two variables, techniques for efficient visible surface algorithms. Algorithms for visible line determination: Z-buffer algorithm, list-priority algorithm.

**Animation:** Conventional and computer assist animation, Animation languages, methods of controlling Animation, Basic rules of animation.

### **Text Books:**

Computer Graphics, Principles & practice. Second edition in c by Foley, Van Dam, Feiner, Hughes, Pearson education, 1996.

### **Reference Books:**

1. D.F. Roger and J.A. Adams (1990), Mathematical elements for computer graphics  
Tata McGraw Hill.
2. Donald Hearn M.Panline Baker, Computer Graphics, Second edition,. Prentice-Hall  
of India Private ltd, 2000.



# **CST41: MULTIMEDIA SYSTEMS**

**Credits: 3**

**Internal Marks: 30**  
**University Exams. Marks: 70**

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## **UNIT –I**

**Introduction to Multimedia:** Multimedia, World Wide Web, Overview of Multimedia Tools, Multimedia Authoring, Graphics/Image Data Types, and File Formats.

**Color in Image and Video:**Color Science — Image Formation, Camera Systems, Gamma Correction, Color Matching Functions, CIE Chromaticity Diagram, Color Monitor Specifications, Out-of-Gamut Colors, White Point Correction, XYZ to RGB Transform, Transform with Gamma Correction, L\*A\*B\* Color Model. Color Models in Images — RGB Color Model for CRT Displays, Subtractive Color: CMV Color Model, Transformation from RGB to CMV, Under Color Removal: CMYK System, Printer Gamuts, Color Models in Video — Video Color Transforms, YUV Color Model, YIQ Color Model, Ycber Color Model.

## **UNIT -II**

**Video Concepts:** Types of Video Signals, Analog Video, Digital Video.

**Audio Concepts:** Digitization of Sound, Quantization and Transmission of Audio.

## **UNIT -III**

### **Compression Algorithms**

**Lossless Compression Algorithms:** Run Length Coding, Variable Length Coding, Arithmetic Coding, Lossless JPEG, Image Compression.

**Lossy Image Compression Algorithms:** Transform Coding: KLT And DCT Coding, Wavelet Based Coding.

**Image Compression Standards:** JPEG and JPEG2000.

## **UNIT – IV**

**Video Compression Techniques:** Introduction to Video Compression, Video Compression Based on Motion Compensation, Search for Motion Vectors, H.261- Intra-Frame and Inter-Frame Coding, Quantization, Encoder and Decoder, Overview of MPEG 1 and MPEG2.

## **UNIT –V**

**Audio Compression Techniques:** ADPCM in Speech Coding, G.726 ADPCM, Vocoders — Phase Insensitivity, Channel Vocoder, Formant Vocoder, Linear Predictive Coding, CELP, Hybrid Excitation Vocoders, MPEG Audio — MPEG Layers, MPEG Audio Strategy, MPEG Audio Compression Algorithms, MPEG-2 AAC, MPEG-4 Audio.

## **TEXT BOOKS**

1. Fundamentals of Multimedia — Ze- Nian Li, Mark S. Drew, PHI, 2010.
2. Multimedia Signals & Systems — Mrinal Kr. Mandal Springer International Edition 1st Edition, 2009

## **REFERENCE BOOKS**

1. Multimedia Communication Systems — Techniques, Stds&Networks KR. Rao, Zorans. Bojkoric, DragoradA.MjIovanj 1st Edition, 2002.
2. Fundamentals of Multimedia Ze- Man Li, Mark S.Drew, Pearson Education (LPE), 1st Edition, 2009.
3. Multimedia Systems John F. KoegelBufond Pearson Education (LPE), 1st Edition, 2003.
4. Digital Video Processing — A. Murat Tekaip, PHI, 1996.
5. Video Processing and Communications — Yaowang, JornOstermann, Ya-QinZhang, Pearson,2002.