



**VEL TECH MULTI TECH  
Dr RANGARAJAN Dr.SAKUNTHALA  
ENGINEERING COLLEGE**

(An ISO 9001: 2008 Certified Institution)

(Owned by Vel Trust)

(Approved by Govt. of Tamil Nadu and affiliated to Anna University and Accredited by  
NBA, New Delhi)



**SYLLABUS**

**WEEKLY SCHEDULE**

**VII SEMESTER 2014 - 2015**

**DEPARTMENT OF ELECTRONICS AND  
COMMUNICATION ENGINEERING**

**IV YEAR DEGREE COURSE**

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## WEEK DETAILS

<b>SL.NO.</b>	<b>WEEK</b>	<b>FROM</b>	<b>TO</b>
1	<b>WEEK1</b>	<b>24-06-2014</b>	<b>27-06-2014</b>
2	<b>WEEK2</b>	<b>30-06-2014</b>	<b>04-07-2014</b>
3	<b>WEEK3</b>	<b>07-07-2014</b>	<b>11-07-2014</b>
4	<b>WEEK4</b>	<b>14-07-2014</b>	<b>18-07-2014</b>
5	<b>WEEK5</b>	<b>21-07-2014</b>	<b>25-07-2014</b>
6	<b>WEEK6</b>	<b>28-07-2014</b>	<b>01-08-2014</b>
7	<b>WEEK7</b>	<b>04-08-2014</b>	<b>08-08-2014</b>
8	<b>WEEK8</b>	<b>11-08-2014</b>	<b>14-08-2014</b>
9	<b>WEEK9</b>	<b>18-08-2014</b>	<b>22-08-2014</b>
10	<b>WEEK10</b>	<b>25-08-2014</b>	<b>28-08-2014</b>
11	<b>WEEK11</b>	<b>01-09-2014</b>	<b>05-09-2014</b>
12	<b>WEEK12</b>	<b>08-09-2014</b>	<b>12-09-2014</b>
13	<b>WEEK13</b>	<b>15-09-2014</b>	<b>19-09-2014</b>
14	<b>WEEK14</b>	<b>22-09-2014</b>	<b>26-09-2014</b>
15	<b>WEEK15</b>	<b>29-09-2014</b>	<b>01-10-2014</b>
16	<b>WEEK16</b>	<b>06-10-2014</b>	<b>10-10-2014</b>
17	<b>WEEK17</b>	<b>13-10-2014</b>	<b>17-10-2014</b>
18	<b>WEEK18</b>	<b>20-10-2014</b>	<b>24-10-2014</b>
19	<b>WEEK19</b>	<b>27-10-2014</b>	<b>31-10-2014</b>

## SUBJECT CONTENTS

<b>SL.NO</b>	<b>SUBJECT CODE</b>	<b>SUBJECT NAME</b>
<b>THEORY</b>		
<b>1</b>	<b>EC2401</b>	<b>Wireless Communication</b>
<b>2</b>	<b>EC2402</b>	<b>Optical Communication and Networking</b>
<b>3</b>	<b>EC2403</b>	<b>RF and Microwave Engineering</b>
<b>4</b>	<b>CS2060</b>	<b>High Speed Networks</b>
<b>5</b>	<b>EC2029</b>	<b>Digital Image Processing</b>
<b>6</b>	<b>GE2022</b>	<b>Total Quality Management</b>
<b>PRACTICAL</b>		
<b>7.</b>	<b>EC2404</b>	<b>Electronics System Design Lab</b>
<b>8.</b>	<b>EC2405</b>	<b>Optical &amp; Microwave Lab</b>

### TEST / EXAM SCHEDULE

SL.NO	SUBJECT CODE	SUBJECT NAME	UNIT TEST I	UNIT TEST II	UNIT TEST III	UNIT TEST IV	UNIT TEST V
1	EC2401	Wireless Communication	08/07/14 FN	30/07/14 FN	20/08/14 FN	09/09/14 FN	29/09/14 FN
2	EC2402	Optical Communication and Networking	08/07/14 AN	30/07/14 AN	20/08/14 AN	09/09/14 AN	29/09/14 AN
3	EC2403	RF and Microwave Engineering	09/07/14 FN	31/07/14 FN	21/08/14 FN	10/09/14 FN	30/09/14 FN
4	CS2060	High Speed Networks	09/07/14 AN	31/07/14 AN	21/08/14 AN	10/09/14 AN	30/09/14 AN
5	EC2029	Digital Image Processing	10/07/14 FN	01/08/14 FN	22/08/14 FN	11/09/14 FN	01/10/14 FN
6	GE2022	Total Quality Management	10/07/14 AN	01/08/14 AN	22/08/14 AN	11/09/14 AN	01/10/14 AN

SL.NO	SUBJECT CODE	SUBJECT NAME	MODEL EXAM
1	EC2401	Wireless Communication	13-10-2014
2	EC2402	Optical Communication and Networking	14-10-2014
3	EC2403	RF and Microwave Engineering	15-10-2014
4	CS2060	High Speed Networks	16-10-2014
5	EC2029	Digital Image Processing	17-10-2014
6	GE2022	Total Quality Management	20-10-2014

# **EC2401 WIRELESS COMMUNICATION**

## **UNIT I SERVICES AND TECHNICAL CHALLENGES**

**WEEK-1** Types of Services, Requirements for the services, Multipath propagation.

**WEEK-2** – Spectrum Limitations, Noise and Interference limited systems

**WEEK-3** - Principles of Cellular networks, Multiple Access Schemes

## **UNIT II WIRELESS PROPAGATION CHANNELS**

### **WEEK-4- UNIT TEST-I**

Propagation Mechanisms (Qualitative treatment), Propagation effects with mobile radio

**WEEK-5** Channel Classification, Link calculations

**WEEK-6** Narrowband and Wideband models

### **WEEK- 7 – UNIT TEST-II**

## **UNIT III WIRELESS TRANSCIVERS**

### **WEEK-8**

Structure of a wireless communication link, Modulation and demodulation – Quadrature Phase Shift Keying,  $\lambda/4$ -Differential Quadrature Phase Shift Keying

**WEEK-9** - Offset-Quadrature Phase Shift Keying, Binary Frequency Shift Keying, Minimum Shift Keying, Gaussian

Minimum Shift Keying, Power spectrum and Error performance in fading channels

## **UNIT IV SIGNAL PROCESSING IN WIRELESS SYSTEMS**

### **WEEK-10 UNIT TEST-III**

Principle of Diversity, Macro diversity, Micro diversity, Signal Combining Techniques,

Transmit diversity, Equalizers

**WEEK-11** Linear and Decision Feedback equalizers, Review of Channel coding and Speech coding techniques.

### **WEEK-12 – UNIT TEST-IV**

## **UNIT V ADVANCED TRANSCEIVER SCHEMES**

**WEEK-13** Spread Spectrum Systems- Cellular Code Division Multiple Access Systems- Principle, Power control, Effects of multipath propagation on Code Division Multiple Access, Orthogonal Frequency

**WEEK-14** Division Multiplexing – Principle, Cyclic Prefix, Transceiver implementation, Second Generation (GSM, IS-95) and Third Generation Wireless Networks and Standards

**WEEK-16- UNIT TEST-V**

**WEEK-17 -MODEL EXAMINATION (5 UNITS)**

### **TEXT BOOKS**

1. Andreas.F. Molisch, “Wireless Communications”, John Wiley – India, 2006.
2. Simon Haykin & Michael Moher, “Modern Wireless Communications”, Pearson Education, 2007.

### **REFERENCE BOOKS**

1. Rappaport. T.S., “Wireless communications”, Pearson Education, 2003.
2. Gordon L. Stuber, “Principles of Mobile Communication”, Springer International Ltd.,2001.
3. Andrea Goldsmith, Wireless Communications, Cambridge University Press, 2007.

## **EC2402 OPTICAL COMMUNICATION AND NETWORKING**

### **UNIT I INTRODUCTION**

**WEEK1** Introduction, Ray theory transmission- Total internal reflection- Acceptance angle –Numerical aperture

**WEEK2** Skew rays – Electromagnetic mode theory of optical propagation – EM waves – modes in Planar guide

**WEEK3** – phase and group velocity – cylindrical fibers – SM fibers.

## **UNIT II TRANSMISSION CHARACTERISTICS OF OPTICAL FIBERS**

### **WEEK-4 UNIT TEST-I**

Attenuation – Material absorption losses in silica glass fibers – Linear and Non linear Scattering losses - Fiber Bend losses – Midband and far band infra red transmission

**WEEK-5** Intra and inter Modal Dispersion – Over all Fiber Dispersion – Polarization- non linear Phenomena. Optical fiber connectors,

**WEEK-6** Fiber alignment and Joint Losses – Fiber Splices – Fiber connectors – Expanded Beam Connectors – Fiber Couplers

### **WEEK 7 - UNIT TEST-II**

## **UNIT III SOURCES AND DETECTORS**

**WEEK-8** - Optical sources: Light Emitting Diodes - LED structures - surface and edge emitters, mono and hetero structures - internal - quantum efficiency, injection laser diode structures - comparison of LED and ILD

**WEEK-9** Optical Detectors: PIN Photo detectors, Avalanche photo diodes, construction, characteristics and properties, Comparison of performance, Photo detector noise –Noise sources , Signal to Noise ratio , Detector response time

## **UNIT IV FIBER OPTIC RECEIVER AND MEASUREMENTS**

### **WEEK-10 UNIT TEST-III**

Fundamental receiver operation, Pre amplifiers, Error sources – Receiver Configuration

– Probability of Error – Quantum limit Fiber Attenuation measurements- Dispersion measurements

**WEEK-11** Fiber Refractive index profile measurements – Fiber cut- off Wave length Measurements – Fiber Numerical Aperture Measurements – Fiber diameter measurements.

## **WEEK-12 UNIT TEST-IV**

## **UNIT V OPTICAL NETWORKS**

**WEEK-13** Basic Networks – SONET / SDH – Broadcast – and –select WDM Networks – Wavelength Routed Networks – Non linear effects on Network performance

**WEEK-14** Performance of WDM + EDFA system – Solitons – Optical CDMA – Ultra High Capacity Networks.

**WEEK-15– Revision class**

**WEEK-16- UNIT TEST-V**

**WEEK-17 -MODEL EXAMINATION (5 UNITS)**

## **TEXT BOOKS**

1. Optical Fiber Communication – John M. Senior – Pearson Education – Second Edition. **2007**
2. Optical Fiber Communication – Gerd Keiser – Mc Graw Hill – Third Edition. **2000**

## **REFERENCE BOOKS**

1. J.Gower, “Optical Communication System”, Prentice Hall of India, 2001
2. Rajiv Ramaswami, “Optical Networks “ , Second Edition, Elsevier , 2004.
3. Govind P. Agrawal, “ Fiber-optic communication systems”, third edition, John Wiley &sons, 2004.
4. R.P. Khare, “Fiber Optics and Optoelectronics”, Oxford University Press, 2007.



# **EC2403 RF AND MICROWAVE ENGINEERING**

## **UNIT I TWO PORT RF NETWORKS-CIRCUIT REPRESENTATION**

**WEEK-1** Low frequency parameters-impedance, admittance, hybrid and ABCD High frequency parameters-Formulation of S parameters

**WEEK-2** properties of S parameters-Reciprocal and lossless networks, transmission matrix

**WEEK-3** – Introduction to component basics, wire, resistor, capacitor and inductor, applications of RF

## **UNIT II RF TRANSISTOR AMPLIFIER DESIGN AND MATCHING NETWORKS**

### **WEEK-4 UNIT TEST-I**

Amplifier power relation, stability considerations, gain considerations noise figure

**WEEK-5** impedance matching networks, frequency response,

**WEEK 6** T and II matching networks, microstripline matching networks

### **WEEK-7 UNIT TEST-II**

## **UNIT III MICROWAVE PASSIVE COMPONENTS**

**WEEK-8** Microwave frequency range, significance of microwave frequency range - applications of microwaves. Scattering matrix -Concept of N port scattering matrix representation- Properties of S matrix- S matrix formulation of two-port junction. Microwave junctions - Tee junctions - Magic Tee - Rat race

**WEEK-9-** Corners - bends and twists - Directional couplers - two hole directional couplers- Ferrites - important microwave properties and applications – Termination - Gyrator- Isolator-Circulator - Attenuator -

Phase changer – S Matrix for microwave components – Cylindrical cavity resonators.

## **UNIT IV MICROWAVE SEMICONDUCTOR DEVICES**

### **WEEK-10 UNIT TEST-III**

Microwave semiconductor devices- operation - characteristics and application of BJTs and FETs -Principles of tunnel diodes - Varactor and Step recovery diodes – Transferred Electron Devices -Gunn diode-Avalanche Transit time devices

**WEEK-11** IMPATT and TRAPATT devices. Parametric devices -Principles of operation - applications of parametric amplifier .Microwave monolithic integrated circuit (MMIC) - Materials and fabrication techniques

### **WEEK-12 UNIT TEST-IV**

## **UNIT V MICROWAVE TUBES AND MEASUREMENTS**

**WEEK-13** Microwave tubes- High frequency limitations - Principle of operation of Multicavity Klystron, Reflex Klystron

**WEEK-14** – Traveling Wave Tube, Magnetron. Microwave measurements: Measurement of power, wavelength, impedance, SWR, attenuation, Q and Phase shift

### **WEEK-15– Revision Class**

### **WEEK-16- UNIT TEST-V**

### **WEEK-17 -MODEL EXAMINATION (5 UNITS)**

## **TEXT BOOKS**

1. Samuel Y Liao, “Microwave Devices & Circuits” , Prentice Hall of India, 2006.
2. Reinhold.Ludwig and Pavel Bretshko ‘RF Circuit Design”, Pearson Education, Inc.,2006

## **REFERENCE BOOKS**

1. Robert. E.Collin-Foundation of Microwave Engg –Mc Graw Hill.
2. Annapurna Das and Sisir K Das, “Microwave Engineering”, Tata Mc Graw Hill Inc., 2004.

3. M.M.Radmanesh , RF & Microwave Electronics Illustrated, Pearson Education, 2007.
4. Robert E.Colin, 2ed “Foundations for Microwave Engineering”, McGraw Hill, 2001
5. D.M.Pozar, “Microwave Engineering.”, John Wiley & sons, Inc., 2006.

## **CS2060 HIGH SPEED NETWORKS**

### **UNIT I HIGH SPEED NETWORKS**

**WEEK-1** Frame Relay Networks – Asynchronous transfer mode – ATM Protocol Architecture,  
ATM logical Connection, ATM Cell – ATM Service Categories

**WEEK-2** AAL, High Speed LANs: Fast Ethernet, Gigabit Ethernet, Fiber Channel

**WEEK-3** - Wireless LANs: applications, requirements – Architecture of 802.11.

### **UNIT II CONGESTION AND TRAFFIC MANAGEMENT**

#### **WEEK-4 UNIT TEST-I**

Queuing Analysis- Queuing Models – Single Server Queues – Effects of Congestion – Congestion Control

**WEEK-5** Traffic Management – Congestion Control in Packet Switching Networks,

**WEEK 6** Frame Relay Congestion Control

#### **WEEK 7 UNIT TEST-II**

### **UNIT III TCP AND ATM CONGESTION CONTROL**

**WEEK 8** TCP Flow control – TCP Congestion Control – Retransmission – Timer Management –Exponential RTO backoff – KARN’s Algorithm – Window management – Performance of TCP over ATM. Traffic and Congestion control in ATM

**WEEK-9** Requirements – Attributes – Traffic Management Frame work, Traffic Control – ABR traffic Management – ABR rate control, RM cell formats, ABR Capacity allocations – GFR traffic management

## **UNIT IV INTEGRATED AND DIFFERENTIATED SERVICES**

### **WEEK-10 UNIT TEST-III**

Integrated Services Architecture – Approach, Components, Services-Queuing Discipline, FQ, PS, BRFQ, GPS, WFQ

**WEEK-11** Random Early Detection, Differentiated Services

### **WEEK-12 UNIT TEST-IV**

## **UNIT V PROTOCOLS FOR QOS SUPPORT**

**WEEK-13** RSVP – Goals & Characteristics, Data Flow, RSVP operations, Protocol Mechanisms –Multiprotocol Label Switching,

**WEEK-14** Operations, Label Stacking, Protocol details – RTP – Protocol Architecture, Data Transfer Protocol, RTCP.

**WEEK-15– Revision class**

**WEEK-16- UNIT TEST-V**

**WEEK-17 MODEL EXAMINATION ( 5 UNITS)**

## **TEXT BOOKS**

1William Stallings, “HIGH SPEED NETWORKS AND INTERNET”, Pearson Education, Second Edition, 2002

## **REFERENCE BOOKS**

1. Warland, Pravin Varaiya, “High performance communication networks”, Second Edition , Jean Harcourt Asia Pvt. Ltd., , 2001.
2. Irvan Pepelnjk, Jim Guichard, Jeff Aparcar, “MPLS and VPN architecture”, Cisco Press, Volume 1 and 2, 2003.
4. Abhijit S. Pandya, Ercan Sea, “ATM Technology for Broad BandTelecommunication Networks”, CRC Press, New York, 2004.

## **EC2029 DIGITAL IMAGE PROCESSING**

### **UNIT I DIGITAL IMAGE FUNDAMENTALS**

**WEEK-1** Elements of digital image processing systems, Vidicon and Digital Camera working principles, Elements of visual perception, brightness, contrast, hue, saturation

**WEEK-2** Mach band effect, Color image fundamentals - RGB, HSI models, Image sampling, Quantization, dither, Two-dimensional mathematical preliminaries,

**WEEK-3** 2D transforms -DFT, DCT, KLT, SVD

### **UNIT II IMAGE ENHANCEMENT**

#### **WEEK-4 UNIT TEST-I**

Histogram equalization and specification techniques, Noise distributions, Spatial averaging, Directional Smoothing

**WEEK 5** Median, Geometric mean, Harmonic mean, Contraharmonic mean filters

**WEEK-6** Homomorphic filtering, Color image enhancement

#### **WEEK 7 UNIT TEST-II**

## **UNIT III IMAGE RESTORATION**

### **WEEK-8 UNIT TEST-III**

Image Restoration - degradation model, unconstrained restoration - Lagrange multiplier and Constrained restoration,

**WEEK-9** Inverse filtering-removal of blur caused by uniform linear motion, Wiener filtering, Geometric transformations-spatial transformations

## **UNIT IV IMAGE SEGMENTATION**

**WEEK-10** Edge detection, Edge linking via Hough transform – Thresholding - Region based segmentation – Region growing – Region splitting and Merging

**WEEK-11** - Segmentation by morphological watersheds – basic concepts – Dam construction – Watershed segmentation algorithm

### **WEEK 12 UNIT TEST-IV**

## **UNIT V IMAGE COMPRESSION**

**WEEK-13** Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding

**WEEK-14** - Vector Quantization, Transform coding, JPEG standard, MPEG

**WEEK-15– Revision Class**

**WEEK-16- UNIT TEST-V**

**WEEK-17 -MODEL EXAMINATION (5 UNITS)**

### **TEXTBOOKS:**

1. Rafael C. Gonzalez, Richard E. Woods, , Digital Image Processing', Pearson , Second Edition, 2004.
2. Anil K. Jain, , Fundamentals of Digital Image Processing', Pearson 2002.

### **REFERENCES:**

1. Kenneth R. Castleman, Digital Image Processing, Pearson, 2006.
2. Rafael C. Gonzalez, Richard E. Woods, Steven Eddins,' Digital Image Processing using MATLAB', Pearson Education, Inc., 2004.

3. D.E. Dudgeon and RM. Mersereau, , 'Multidimensional Digital Signal Processing', Prentice Hall Professional Technical Reference, 1990.
4. William K. Pratt, , 'Digital Image Processing' , John Wiley, New York, 2002
5. Milan Sonka et al, 'IMAGE PROCESSING, ANALYSIS AND MACHINE VISION', Brookes/Cole, Vikas Publishing House, 2nd edition, 1999

## **GE2022 TOTAL QUALITY MANAGEMENT**

### **UNIT I INTRODUCTION**

**WEEK-1** Introduction - Need for quality - Evolution of quality - Definition of quality - Dimensions of manufacturing and service quality.

**WEEK-2** Basic concepts of TQM - Definition of TQM – TQM Framework

**WEEK-3** Contributions of Deming, Juran and Crosby – Barriers to TQM.

### **UNIT II TQM PRINCIPLES**

#### **WEEK-4- UNIT TEST-I**

Leadership – Strategic quality planning, Quality statements - Customer focus –Customer orientation, Customer satisfaction, Customer complaints, Customer retention -Employee involvement – Motivation, Empowerment

**WEEK-5** Team and Teamwork, Recognition and Reward, Performance appraisal - Continuous process improvement

**WEEK-6** PDCA cycle,5s, Kaizen - Supplier partnership – Partnering, Supplier selection, Supplier Rating.

#### **WEEK- 7 – UNIT TEST-II**

### **UNIT III TQM TOOLS & TECHNIQUES I**

**WEEK-8** The seven traditional tools of quality – New management tools – Six-sigma: Concepts, methodology,

**WEEK-9** applications to manufacturing, service sector including IT – Bench marking – Reason to bench mark, Bench marking process – FMEA – Stages, Types

## **UNIT IV TQM TOOLS & TECHNIQUES II**

### **WEEK-10 UNIT TEST-III**

Quality circles – Quality Function Deployment (QFD) – Taguchi quality loss function –TPM

**WEEK-11** - Concepts, improvement needs – Cost of Quality – Performance measures

### **WEEK- 12 – UNIT TEST-IV**

## **UNIT V QUALITY SYSTEMS**

**WEEK-13** Need for ISO 9000- ISO 9000-2000 Quality System – Elements, Documentation, Quality auditing- QS 9000 – ISO 14000

**WEEK-14** - Concepts, Requirements and Benefits – Case studies of TQM implementation in manufacturing and service sectors including IT

**WEEK-15– Revision Class**

**WEEK-16- UNIT TEST-V**

**WEEK-17 -MODEL EXAMINATION (5 UNITS)**

## **TEXT BOOK**

1. Dale H.Besterfield, et al., “Total Quality Management”, Pearson Education Asia, 3rd Edition, Indian Reprint (2006).

## **REFERENCES**

1. James R. Evans and William M. Lindsay, “The Management and Control of Quality”, 6th Edition, South-Western (Thomson Learning), 2005.
2. Oakland, J.S., “TQM – Text with Cases”, Butterworth – Heinemann Ltd., Oxford, 3<sup>rd</sup> Edition, 2003.
3. Suganthi,L and Anand Samuel, “Total Quality Management”, Prentice Hall (India) Pvt. Ltd.,2006.
4. Janakiraman, B and Gopal, R.K, “Total Quality Management – Text and Cases”, Prentice Hall (India) Pvt. Ltd., 2006.

## **EC2405 OPTICAL & MICROWAVE LAB**

### **Microwave Experiments:**

1. Reflex Klystron – Mode characteristics
2. Gunn Diode – Characteristics
3. VSWR, Frequency and Wave Length Measurement



4. Directional Coupler – Directivity and Coupling Coefficient – S – parameter measurement
5. Isolator and Circulator – S - parameter measurement
6. Attenuation and Power measurement
7. S - matrix Characterization of E-Plane T, H-Plane T and Magic T.
8. Radiation Pattern of Antennas.
9. Antenna Gain Measurement

### **Optical Experiments:**

1. DC characteristics of LED and PIN Photo Diode.
2. Mode Characteristics of Fibers
3. Measurement of Connector and Bending Losses.
4. Fiber Optic Analog and Digital Link
5. Numerical Aperture Determination for Fibers
6. Attenuation Measurement in Fibers

## **EC2404 ELECTRONICS SYSTEM DESIGN LAB**

1. Design of a 4-20mA transmitter for a bridge type transducer.  
Design the Instrumentation amplifier with the bridge type transducer (Thermistor or any resistance variation transducers) and convert the amplified voltage from the instrumentation amplifier to 4 – 20 mA current using op-amp. Plot the variation of the temperature Vs output current.
2. Design of AC/DC voltage regulator using SCR  
Design a phase controlled voltage regulator using full wave rectifier and SCR, vary the conduction angle and plot the output voltage.
3. Design of process control timer Design a sequential timer to switch on & off at least 3 relays in a particular sequence using timer IC.
4. Design of AM / FM modulator / demodulator
  - i. Design AM signal using multiplier IC for the given carrier frequency and modulation index and demodulate the AM signal using envelope detector.
  - ii. Design FM signal using VCO IC NE566 for the given carrier frequency and demodulate the same using PLL NE 565.
5. Design of Wireless data modem.  
Design a FSK modulator using 555/XR 2206 and convert it to sine wave using filter and transmit the same using IR LED and demodulate the same PLL NE 565/XR 2212.
6. PCB layout design using CAD

Drawing the schematic of simple electronic circuit and design of PCB layout using CAD

7. Microcontroller based systems design

Design of microcontroller based system for simple applications like security systems combination lock.

8. DSP based system design

Design a DSP based system for echo cancellation, using TMS/ADSP DSP kit.

9. Psuedo-random Sequence Generator

10. Arithmetic Logic Unit Design