



SYLLABUS FOR B.SC (ELECTRONICS AND COMMUNICATION)

CBCS pattern, 2020-2021 onwards - Semester III to Semester VI



**MANONMANIAM SUNDARANAR UNIVERSITY,
TIRUNELVELI**

REGULATIONS

DURATION OF THE COURSE:

Three Years divided into **Six semesters**. Each semester will be of 90 working days.

COURSE OF STUDY:

It's under CBCS (Choice Based Credit System) pattern according to the syllabus and books prescribed from time to time.

ELIGIBILITY:

As per the guidelines for the admission of Under Graduate (UG) students by Department of Collegiate Education, Chennai.

FOUNDATION SUBJECTS:

PART I: Tamil / Hindi / Malayalam as per MSU guidelines

PART II: English

ALLIED SUBJECTS:

Have to choose any two allied subjects apart from the core/major subjects. (For. e.g. Mathematics, Physics, Computer Science, Information Technology (IT), Chemistry...)

SCHEME OF EXAMINATIONS:

As per the CBCS pattern with SE (Secured External Examinations score) and IA (Internal Assessment score)

QUESTION PAPER PATTERN FOR ALL UG COURSES:

THEORY PAPERS:

MARKS FOR INTERNAL: (MAX. Marks: 25, Passing minimum: 10 marks)

Marks distribution:

Cycle test and model exam: 20 marks

Assignment : 5 marks

Total : 25 marks

MARKS FOR EXTERNAL: (Max. Marks: 75, Passing minimum: 30 marks, Time: 3 Hours)

1. Part A (10 x 1 = 10 marks), Answer All questions, Two questions from each unit
2. Part B (5 x 5 = 25 marks), Answer All questions, One question from each unit with internal Choice
3. Part C (5 x 8 = 40 marks), Answer All questions, One question from each unit with internal Choice

PRACTICAL PAPERS:

TIME: 3 Hours, Maximum Marks: 50 (External) and 50 (Internal). Marks will be calculated by laboratory performance, attendance, record note book maintenance, model practical's examination.

MINI PROJECT, INERNSHIP / FIELD WORK (maximum marks): IA: 50 marks and SE: 50 marks

PROJECT WORK (maximum marks): IA: 50 marks and SE: 50 marks

MOOCS course (maximum marks): IA: 25 marks and SE: 75 marks

Sl.No.	Category of Subjects	Contact Hrs/week	Credits	Max Marks/Exam Time (SE:IA/Hrs)
SEMESTER III				
17.	Core Theory-3, Applied Electronics	4	4	75:25/3
18.	Core Theory- 4, Electronic Measurement and Circuit Theory	4	4	75:25/3
19.	Core Practical III- Electronic Circuits Lab – I	3	1	50:50/3
20.	Core Practical IV- Measurements Lab	3	1	50:50/3
21.	Allied Theory- III (for Electronics & Comm.)-Applied Mathematics, Allied Theory- III (for others)-Electronic Communication System	3	3	75:25/3
22.	Allied Practical III (for Electronics & Comm)-Simulations of Applied Mathematics Allied Practical III (for others)-Electronic Devices Lab	3	1	50:50/3
23.	Skill Based Core-Cellular Phone System	4	4	75:25/3
24.	Non-Major Elective (Select anyone) 1. Applied Electric Circuits 2. Bio-medical Electronics	2	2	75:25/3
25.	Common-Yoga	2	1	50:50/3
26.	At least any one of the subject oriented online MOOC courses	2	2	75:25/3
Subtotal		30	23	

SEMESTER IV				
27.	Core Theory 5, Linear Integrated Circuits	4	4	75:25/3
28.	Core Theory 6, Telecommunication systems	4	4	75:25/3
29.	Core Practical V-Linear Integrated Circuits Lab	3	1	50:50/3
30.	Core Practical VI- Electronic Circuits Lab – II	3	1	50:50/3
31.	Allied Theory - IV (for Electronics & Comm.)-Numerical methods Allied Theory - IV (for others)-Advanced Communication System	3	3	75:25/3
32.	Allied Practical IV (for Electronics & Comm.)- MATLAB simulation for numerical methods Allied Practical IV (for others) - Electronic communication Lab	2	1	50:50/3
33.	Skill Based Core-Maintenance and Troubleshooting of Audio-Video Equipment	4	4	75:25/3
34.	Non-Major Elective (Select anyone) 1. Industrial Controls 2. Power converters	2	2	75:25/3
35.	Extension Activity –NCC, NSS, YRC, YWF, PE-	0	1	
36.	Common-Computers for Digital Era	2	2	50:50/3
37.	Internship / Field work	3	2	50:50/3
Subtotal		30	25	
SEMESTER V				
38.	Core Theory 7, Advanced Microprocessors	4	4	75:25/3
39.	Core Theory 8, Communication Systems	4	4	75:25/3
40.	Core Theory 9, IOT based applications	4	4	75:25/3
41.	Core Theory 10, Mobile communication	4	4	75:25/3
42.	Core Practical VII- Advanced Microprocessors Lab	3	1	50:50/3

43.	Core Theory Elective - I (Select any one)	1. Optical Display Applications 2. VLSI technology	4	4	75:25/3
44.	Skill Based Common- Personality Development/Effective Communication/Youth Leadership		2	2	75:25/3
45.	Mini Project		5	3	50:50/3
Subtotal			30	26	
SEMESTER VI					
46.	Core Theory 11, Antennas		4	4	75:25/3
47.	Core Theory 12, Optical Fiber Communication		4	4	75:25/3
48.	Core Theory 13, Artificial Intelligence		4	4	75:25/3
49.	Core Theory 14, Computer Hardware and Maintenance		4	4	75:25/3
50.	Core Practical VIII-Communication System and System Design Lab		3	1	50:50/3
51.	Core Elective – II (Select any one)	1. Printed Circuit Boards 2. Embedded System and RTOS	4	4	75:25/3
52.	Major Project		7	7	50:50/3
Subtotal			30	28	
Total				148	

Total number of Credits from Semester I to VI: 148 and 38 courses in total.

Total number of core courses: 30 (14-Theories + 2-skill-based core + 2-Electives + 8-Practicals +1-FW/Internship + 1-Project +1-Miniproject + 1-online initiative courses-MOOC)

Total number of Elective courses:2 (V and VI -semesters, respectively with having 2 options)

Skill based core courses: 2

Skill based common courses: 5

Allied Theory + Allied Practical courses (for major students): 4 + 4 = 8

Allied Theory + Allied Practical courses (for other major students): 4 + 4 = 8

Total Hours / Week = 180 for 6 semesters (i.e. 3 years)

OBJECTIVES:

- This paper provides the knowledge and operation of rectifiers, filter circuits, amplifiers and oscillators.

UNIT I

RECTIFIERS: Rectifiers- half wave rectifier, full wave rectifier, bridge rectifier, Inductor-Capacitor-L type filters-ripple factor-Voltage regulator (series type)-current limit over load production- introduction to IC fixed and variable IC 723,78XX,79XX-voltage regulators.**TRANSFORMERS:**Working principle of transformers-Transformer Construction-Core type transformer.

(12L)

UNIT II

AMPLIFIERS: Amplifiers-general principle of operation-classification of amplifiers-classification of distortion (amplitudes, frequency, phase)-RC coupled amplifier-gain-frequency response- input and output impedance -multistage amplifiers-transformer couple amplifiers-frequency response. (12L)

UNIT III

POWER AMPLIFIERS: Introduction-classification power amplifier-class A power amplifier-class A push pull amplifier- class B power amplifier- class B push pull amplifier- class C power amplifier- class C push pull amplifier-power dissipation outputpower-distortion. (12L)

UNIT IV

FEEDBACK AMPLIFIERS: Feedback-basic concepts-characteristics-effect of negative feedback- on gain-stability- distortion-band width- analysis of voltage and current feedback amplifier circuits. (12L)

UNIT V

OSCILLATORS:Classification of oscillators-use of positive feedback – Barkhausen criterion for oscillation- Colpitts oscillator-Hartley oscillator-Wein bridge oscillator- phase shift oscillator-crystal oscillator-frequency stability of oscillators-multivibrators. (12L)

(Total: 60L)

TEXT BOOKS:

1. Electronic devices and circuits-Millman &Halkias.
2. Electronic devices and applications and Integratedcircuits-Mathu.
3. BasicElectronics-B.L.Theraja.
4. Electronic devices and circuits- G.K.Mithal,Khannapublishers.
5. Electronic devices and circuits – Allenmottershead.
6. Problems and solutions of electronic devices and circuits-Experience teachers (CBS publication, NewDelhi).
7. Electrical Technology-B.LTheraja, A.K. Theraja
8. Basic electrical Engg -P.SDhagal TMH

COURSE RESULTS: Students can able to design with rectifiers, filter circuits, amplifiers and oscillators.

ELECTRONIC MEASUREMENTS AND CIRCUIT THEORY

LTPC
4 00 4

OBJECTIVES:

- This paper provides the knowledge of electrical and electronic measurements and circuit theory. Students can able to understand the measurements theoretically and will do the circuit design as per the electrical circuit laws and theorems.

UNIT I

MEASUREMENTS: Measurements, errors in measurements- measurement standard, Classification and characteristics of Transducers, AC/DC Bridge measurements and their applications. (12L)

UNIT II

MEASURING INSTRUMENTS: PMMC – DC ammeter – DC voltmeter - Voltmeter sensitivity - Ohm meter – VOM or Multimeter – Calibration Digital Voltmeters and Multimeters, AC Voltmeter-Vector Voltmeter- CRO-Block Diagram – single beam – dual trace – Sampling Oscilloscope. (12L)

UNIT III

DC CIRCUITS: Ohms Law-power Energy-resistors in series, parallel- Kirchoff's Laws and their applications– Branch and loop currents- mesh and node analysis- Simple Problems. (12L)

UNIT IV

AC CIRCUITS: Fundamental ideas of AC circuits - impedance of RL, RC, RLC circuits- Resonance in AC circuits- series and parallel-Simple problems. (12L)

UNIT V

NETWORKS: Network graph of a network- concept of tree- branches and chords dual networks- Network theorems: Superposition, Thevenin, Norton, Maximum Power transfer Theorem Simple Problems. (12L)

(Total:60L)

TEXT BOOKS:

1. C.S.Rangan-Instrumentation DevicesandSystems, Tata McGraw Hill, 1998.
2. Copper -Electronic Instrumentation and Measurement Techniques, PHI
3. A.J. Bouwels —Digital Instrumentation, McGraw Hill, 1986
4. C.Barney-IntelligentInstrumentation, Prentice Hall ofIndia, 1985
5. Oliverand Cage-Electronic Measurements andInstrumentationMcGrawHILL, 1975
6. Deobelin-Measurements Systems| McGraw HILL, 1990
7. Electronic circuits – Edminister (Schaum outline series –TMH)
8. Circuits and networks, Analysis and synthesis – A.Sudakar&S.P.Shyammohan(TMh).
9. Networks, analysis and synthesis – Umeshsinha.
10. Electronic circuits Theory – Dr.M.Arumugam&Dr.N.Prem Kumaran (Khanna Publishers)

COURSE RESULTS: Students can able to understand and design the AC & DC circuits, measuring instruments and networks.

ELECTRONIC CIRCUIT LAB - I

LTPC
0031

OBJECTIVES:

- To construct and design various electronic components practically by using electrical laws and theorems.
1. To familiarize with basic electronic components (R, C, L, diodes, transistors), Digital Multimeter, Function Generator and Oscilloscope.
 2. Resistors and capacitors in series and parallel
 3. Verification of Ohm's Law
 4. Measurement of Amplitude, Frequency & Phase difference using Oscilloscope.
 5. Verification of Kirchoff's laws.
 6. Verification of Thevenin's theorem
 7. Verification of Norton's theorem.
 8. Verification of Superposition Theorem.
 9. Verification of Reciprocity Theorem.
 10. Verification of Millman's theorem.
 11. Verification of Maximum Power Transfer Theorem.
 12. Transient Response and analysis of RLC circuit
 13. To plot frequency response of a series resonant circuit.
 14. To plot frequency response of a parallel resonant circuit.

COURSE RESULTS:

Students will be able to design the circuits practically by using Electrical laws and Theorem

MEASUREMENTS LAB

**LTPC
0 0 31**

OBJECTIVES:

- Give a practical experience to construct various types of electronic measurements.
1. Wheatstonebridge
 2. Kelvin doublebridge
 3. Maxwellbridge
 4. Haybridge
 5. Scheringbridge
 6. LVDT
 7. Displacement meter using straingauge
 8. Transducer Applications andMeasurement
 9. Extension of range of PMMCmeter
 10. Current Measurement usingsensors
 11. Measurement of displacement, rotary displacement using magneticpickup.
 12. Measurement of load using strain gauge-based loadcell.
 13. Measurement of flow rate byanemometer
 14. Measurement of temperature byRTD.
 15. Measurement of temperature bythermocouple

COURSE RESULTS:Understand the concepts about various types of measurements and Itsapplication

Semester – III / Allied Theory –3 (for major students)

APPLIED MATHEMATICS

L T P C
0 3 0 3

OBJECTIVES:

- This is a basic mathematics course. It provides knowledge for solving various mathematical equations.

UNIT I

SOLUTIONS OF SYSTEM OF LINEAR EQUATIONS:

Gauss-elimination and LU-decomposition, Numerical methods for solving non-linear algebraic / transcendental. Newton's method, Secant, Regula Falsi, Jacobi Numerical solution set of linear algebraic equations: Jacobi, Gauss Siedel and under / over relaxation methods **(9L)**

UNIT II

INTERPOLATION AND EXTRAPOLATION:

Interpolation and extrapolation for equal and non-equal spaced data (Newtons Forward, Newtonsbackward and Lagrange) Numerical integration (trapezoidal rule, Simpson's Rule)**(9L)**

UNIT III

PROBABILITY OF STATISTICS:

Functions of random variables, probability distribution functions, expectation, moments Statistical hypothesis tests, t-tests for one and two samples, F-test, χ^2 -test Statistical Methods for Data Fitting: Linear, multi-linear, non-linear regression **(9L)**

UNIT IV

DIFFERENTIAL CALCULUS:

Higher order differentiation and Leibnitz Rule for the derivative, Taylor's and Maclaurin's theorems, Maxima/Minima, convexity of functions, Radius of curvature; **(9L)**

UNIT V

INTEGRAL CALCULUS:

Beta and Gamma functions, Differentiation under the integral sign, surface integrals, volume integrals **(9L)**

(Total: 45L)

TEXT AND REFERENCE BOOKS:

1. Advanced Engineering Mathematics, Erwin Kreyszig, John-Wiely
2. Advanced Engineering Mathematics S. R. K. Iyengar, R. K. Jain, Narosa
3. Introductory Methods Of Numerical Analysis, S. S. Sastry, PHI.
4. A First Course in Probability, Sheldon Ross, Pearson Prentice Hall
5. Probability and Statistics in Engineering, W.W. Hines, D. C. Montgomery, D.M. Goldsman, John-Wiely

COURSE RESULTS:Students should be able to explain basic concepts of matrix theory, numerical techniques, probability distributions and calculus of single variable. They can able to apply basic concepts of differential calculus to solve problems related to extremum, approximations, curvature etc., They can be able to apply basic numerical techniques to solve linear and nonlinear equations.

Semester – III / Allied Theory –3 (for other major students)

ELECTRONIC COMMUNICATION SYSTEMS

LTPC
3003

OBJECTIVES: It imparts the basics of communication systems, transmitter and receiver. To understand the analog modulation and demodulation techniques. To analyze the adverse effect of noise on signals. Analyze and interpret data considering the limitations of various modulation techniques.

UNIT I

PROPAGATION OF RADIO WAVES: Introduction to EM waves – Reflection and refraction of radio waves at the surface of the earth – Ground wave propagation-Sky wave propagation – Space wave propagation – Structure of the Atmosphere – Critical frequency - Skip distance – Maximum Usable frequency (MUF) – Virtual height.

(9L)

UNIT II

AM GENERATION & TRANSMISSION: Need for modulation – Amplitude modulation – Frequency Spectrum of the AM Wave - Modulation Index – Power relations in the AM Wave – AM generation – AM Transmitter. - Forms of Amplitude Modulation – Evolution of SSB – Balanced Modulator – Methods of SSB Generation – Vestigial side band Transmission.

(9L)

UNIT III

FM GENERATION & TRANSMISSION: Frequency Modulation - Frequency Spectrum of the FM Wave – Modulation Index – Effect of Noise – Adjacent & Co-Channel Interference – Wide Band & Narrow Band FM-FM Generation – Direct and Indirect methods - FM Transmitter – Pre-Emphasis.

(9L)

UNIT IV

AM & FM RECEPTION: AM Receiver – TRF Receiver – Super Heterodyne Receiver – Image Frequency Rejection – Frequency Changing & Tracking – Choice of IF – AM Detection – AGC – SSB Detection. FM Receiver – Amplitude Limiter – De-Emphasis – FM Detection – Balanced Slope Detector – Phase Discriminator – Ratio Detector.

(9L)

UNIT V

PULSE MODULATION: PAM Modulation & Detection – PWM Modulation & Detection - PPM Modulation & Detection - Sampling Theorem – Quantization & Quantization Error – PCM Modulation & Detection - Companding – ASK – FSK – BPSK – QPSK – DPSK.

(9L)

(Total:45L)

TEXT BOOKS:

1. Electronic communication systems- Kennedy-TMH – IV edition
2. Electronic communication systems - Roddy & Collen – PHI – IV edition
3. Electronic communications – Sanjeev Gupta – Khanna publications.
4. Principles of communication engineering – Anokh Singh – S.Chand.

COURSE RESULTS: Students can apply their knowledge to engineering mathematical concepts in various communication techniques.

Semester – III / Allied Practical –3 (for major students)

SIMULATIONS OF APPLIED MATHEMATICS

L T P C

OBJECTIVES:

0 0 3 1

- Students will understand the basics of computer programming with the exposure of excel for statistical tools, analysis for engineering applications and statistical computations such as regression, testing of hypothesis using R programming language.

List of experimental course contents are given below:

1. Basic Introduction to Spreadsheet Programs,
2. Plotting Graphs of Functions and Data Plotting.
3. Exploring Basic Statistics, Hypothesis Testing with Spreadsheet.
4. Numerical Solution of Linear and Non-Linear Equations.
5. Basic Introduction to R
6. Exploring Distribution Function in R.
7. Hypothesis Testing in R.
8. Basic Regression Analysis in R

COURSE RESULTS: Students can carry out basic statistical mathematical analysis using excel including hypothesis testing and they can solve linear and nonlinear equations numerically using Excel. Moreover, they can understand the basic features of R programming.

Semester – III / Allied Practical –3 (for other major students)

ELECTRONIC COMMUNICATION LAB-I

**LTPC
0 0 31**

OBJECTIVES:

- This course provides the basic knowledge of communication devices.
- Knowledge of modulation and demodulation techniques, amplifier, oscillators, multiplexing and different types of modulation and demodulation circuits etc.,

List of experiments:

1. Amplitude Modulation (AM) and Demodulation
2. Frequency Modulation and Demodulation
3. Amplitude Shift Keying (ASK) modulation and Demodulation
4. Frequency Shift Keying (FSK)
5. Phase Locked Loop (PLL) and Frequency Multiplier
6. Voltage Controlled Oscillator (VCO)
7. Time Division Multiplexing using (TDM)
8. Binary Phase Shift Keying (BPSK)
9. Pulse Width Modulation (PWM)
10. Directional characteristics of micro phone and loud speakers.
11. Measurement of Connector and Bending Losses in optical fibers.
12. Numerical Aperture Determination for optical Fibers

COURSE RESULTS: Students had experience with the basic knowledge of communication devices, signals such as modulators, demodulators, modulation, demodulation, multiplexing and so on. They can understand about audio based device accessories (microphone, speaker and amplifier, etc..)

CELLULAR PHONE SYSTEM

LTPC

4004

OBJECTIVES:

- This paper gives the concepts of cellular communication systems, study about different types of cell phones, messaging and different mobile standards and services.

UNIT I

THE CELLULAR SYSTEM: The cellular concept - interference Vs capacity, cell splitting, sectorization. The cellular system-mobile location, in call handover and power control in cell planning. TACS standard. The cellular network - Base stations, MSC, services. (12L)

UNIT II

INTRODUCTION TO MOBILE DEVICES: Device overview - Input mechanisms - keypad input, pen-based input and voice input. Mobile phone classifications - web enabled phones - Low end smart phones - palm sized PDA - High end smart phones. (12L)

UNIT III

CELLULAR TECHNOLOGY: Introduction - RF issues - Digital modulation - Power control - Frequency hopping. Signal processing - Digital speech coding - Channel coding and decoding. Software - Radio system software, network management software. (12L)

UNIT IV

MESSAGING AND SECURITY: Mobile messaging – SMS, EMS, MMS, instant messaging. Message value chain – Wireless carrier, mobile message-oriented middleware (MOM). Security threats – spoofing, sniffing, tampering, theft. (12L)

UNIT V

MOBILE STANDARDS: WPAN standards - IrDA, Bluetooth, 1G, 2G standards, 2.5G applications. 3G devices and applications. Network protocols - TDMA (2G), GSM (2G), CDMA one (2G), PDC 2(G), GPRS (2.5G), CDMA 2000 1x (2.5G), EDGE (3G), CDMA 2000 1xEV (3G), WCDMA (G). (12L)

(Total:60L)

TEXT BOOKS:

1. Martyn Mallick, Mobile and Wireless Design Essentials, Wiley Publishing, Inc, New Delhi. 2006.
2. R.C.V.Macario, Personal and Mobile Radio Systems, IEE Telecommunications series 25.

COURSE RESULTS: Students can able to understand the concepts of cellular communication and identify the standard system for a better communication technique from various stages of evolution. They can analyze the limitations of various mobile standards. Students can employ appropriate solutions for various issues of mobile system and network.

1. APPLIED ELECTRIC CIRCUITS

LTPC

2002

OBJECTIVES:

- The objective of this paper is to introduce the basic concepts related to the operation of electrical circuit components.
- To understand basic electronic components and their effects in DC and aAC circuits.
- To apply circuit theorems to simplify and to find solutions to electrical circuits.
- To build-up strong problem-solving skills by effectively formulate a circuit problem into a mathematical problem using circuit laws and theorems.

UNIT I

CIRCUIT COMPONENTS: Resistors, Capacitors & Inductors in Series and Parallel - Factors governing the Resistance of a Resistor, Capacitor & Inductor - Colour Coding of Resistors - Energy Stored in a Capacitor- Energy Stored in an Inductor.

(6L)

UNIT-II

CIRCUIT LAWS: Ohms Law - Kirchoff's Voltage Law - Kirchoff's Current Law - Current Division - Voltage Division - Star Connection - Delta Connection - Series Circuits - Parallel Circuits - Series & Parallel Circuits - Open Circuit - Short Circuit - Simple Problems.

(6L)

UNIT III

THEOREMS: Super Position Theorem – Thevenin's Theorem – Norton's Theorem – Millman's Theorem Maximum Power Transfer Theorem. (6L)

UNIT IV

AC CIRCUIT BASICS: Sinusoidal and Non-Sinusoidal Waveforms – Peak Value – Peak to Peak Value – Average Value – RMS Value – Period and Frequency Measurement - Power Factor - Real Power – Reactive Power

(6L)

UNIT V

RESONANCE: Capacitive Reactance – Inductive Reactance – Impedance – RL and RC in Series and Parallel– RLC in Series and Parallel – Series Resonance - Parallel Resonance (6L)

(Total:30L)

TEXT BOOKS:

1. Circuits And Networks: Analysis and Synthesis - Sudhakar & Shyam Mohan - TMH - IV Edition
2. Basic Electronics – Bernard Grob – McGraw Hill.

COURSE RESULTS: Students could understand passive components and their working principles. It gives basic problem-solving skills towards electric circuits through organizing available information by using circuit laws

Semester – III / Non-Major Elective (for other major)

2. BIO-MEDICAL ELECTRONICS

LTPC

2 0 0 2

OBJECTIVES:

- This course provides the opportunity to understand the working principles of various bio-potentials, transducers, various measuring instruments related to human body check-up.

UNIT I

HUMAN PHYSIOLOGY: Introduction to Human Physiology – Micro Electrodes – Skin Surface Electrodes – Needle Electrodes – Reference Electrodes. **(6L)**

UNIT II

METERS & RECORDERS:

Digital Thermometer–Sphygmomanometer-Electronic Stethoscope-ECG – EEG - EMG. **(6L)**

UNIT III

TEST EQUIPMENT: Cardiac Stress Test Equipment – Cardiotocography - Electro Oculography - Electro Retinography - Polysomnography - Spirometer - Blood Flow Meter - Vascular Doppler – Audiometer **(6L)**

UNIT IV

OPERATION THEATRE EQUIPMENTS:Boyles Apparatus - Upper Endoscope - Lower Endoscope - ENT Endoscope – Laparoscope **(6L)**

UNIT V

DIATHERMY: Diathermy - Surgical Diathermy- Micro Wave Diathermy – Multiparameter Patient Monitor. **(6L)**

(Total:30L)

REFERENCE BOOKS:

1. Biomedical Instrumentation & Measurements – Ananda Natarajan – PHI
2. Biomedical Instrumentation and Measurements - Leslie Cromwell, Fred Weibell, Erich A.Pfeiffer - PHI - 2nd Edition.
3. Bio-Medical Instrumentation - Dr.M.Arumugam – Anuradha Agencies - 2nd Edition
4. Handbook of Biomedical Instrumentation - R.S.Khandpur – TMH.
5. Medical Instrumentation, Application and Design – John G.Webster - WEL - 3rd Edition

COURSE RESULT: Students should have understood the concept of bio- potential, bio-medical instruments, maintenance and troubleshoot instrumentation skills.

Online MOOCS courses

Students can participate at least any one of the subject oriented (Electronics and or Electronics and Communication) technical online programs or courses (i.e., skill development courses) from SWAYAM, NPTEL, UGC and MHRD approved courses.

Massive Open Online Courses (MOOCs) will provide an affordable and flexible way to learn new skills, advance your career and deliver quality educational experiences at various scale. The objective of this course is to take the best teaching learning resources to all, including the most disadvantaged students. The courses may be included with

- (1) video lecture,
- (2) specially prepared reading material that can be downloaded/printed
- (3) self-assessment tests through tests and quizzes and
- (4) an online discussion forum for clearing the doubts.

Steps have been taken to enrich the learning experience by using audio-video and multi-media and state of the art pedagogy / technology.

Teachers should provide wonderful opportunities and environments for all students by providing numerous online platforms to enhance their online education. Final examination may be conducted by their own teaching staffs similar to Field Work.

LINEAR INTEGRATED CIRCUITS

LTPC
4004

OBJECTIVES:

- Provide the fundamental knowledge of analog IC's, differential Amplifiers, characteristics of operational amplifiers (OPAMPs), filters, wave form generators, comparators, multivibrators and various OPAMP applications.

UNIT I

DIFFERENTIAL AMPLIFIERS

Differential amplifiers-dual input-balance output differential amplifier- current mirror- level translator- block diagram representation of typical op amp- interpreting a typical set of data sheets- the ideal OPAMP- equivalent circuit of an op amp- ideal voltage transfer curve.

(12L)

UNIT II

OPAMP CHARACTERISTICS

Input off set voltage – input bias current- input offset current- total output offset voltage- input and output resistance-thermal drift-CMRR-voltage shunt and voltage series feedback amplifiers.

(10L)

UNIT III

FREQUENCY RESPONSE

Frequency response of initially compensated OPAMP- circuit stability-slew rate. Filters low pass filters- high pass filters- band pass filters-band reject filters-all pass filters.

(12L)

UNIT IV

OPAMP APPLICATIONS

Adder-subtractor-Integrator-differentiator – V to I and I to V converter. Oscillator Principles-types-frequency stability phase shift oscillator-Wein bridge oscillator- square wave generator –triangular wave generator.

(14L)

UNIT V

COMPARATOR

Comparator-Schmitt trigger-clipper and clamper-peak detector-zero crossing detectors- IC-555 function block diagram-mono stable operation –Astable operation –applications

(12L)

(Total:60L)

COURSE RESULTS: Knowledge of analog integrated ICs, circuits and devices are obtained.

TEXT BOOKS:

1. Linear Integrated Circuits- D.Roychoudry&Shail Jain (New age publications1999).
2. Operational amplifiers and linear integrated circuits-F.Couglin&Drison (4th edition prentice hall of India,1992).
3. Operational amplifiers and linear integrated circuits- Denton J.Dailey, McGraw Hill 1989.
4. Operational amplifiers and linear integrated circuits-Ramakant A.Gayakwad 3rd editionPHI.
5. Second Edn. Operational amplifiers and Linear Ics-David A.Bell.

TELECOMUNICATION SYSTEMS

LTPC
4 00 4

OBJECTIVES:

- To equip the students with basic knowledge of telephones, working principles, their signaling, switching of telephones, traffic handling and transmission media.
- Provide the opportunity to learn about FAX machines, mobile networks and knowledge of mobile communication.

UNIT I

EVOLUTION OF TELE-COMMUNICATION: Basic Switching System, Simple Tele-phone Communication, Telephone Transmitter, Telephone receiver, Telephone's bell & dialer pulsing mechanism, subscriber's telephone sets, dialing types, signaling tones. Brief Introduction to Electromagnetic Exchanges. (12L)

UNIT II

ELECTRONIC SWITCHING: Space division switching stored programme control – Centralized SPC, Distributed SPC, Software Architecture, Application Software – Enhanced Services, Multi Stage Switching Networks. (12L)

UNIT III

TIME DIVISION SWITCHING: Time Division space switching, Time Division Time Switching, Time multiplexed space switching, and Time multiplexed Time Switching, Combination Switching. (12L)

UNIT IV

TRAFFIC ENGINEERING: Grade of Service and Blocking Probability - Telephone Networks, Subscriber Loops, Switching Hierarchy and Routing, Signaling Techniques, In Channel, Common Channel, Transmission media. (12L)

UNIT V

FAX SYSTEM: Basic facsimile system, facsimile applications working of FAX machines, recording media, FAX reproduction technique. Mobile radiocommunication: Introduction, cellular structures & planning, Frequency allocation, propagation Problems, Base station antennas, Mobile unit antenna Type of mobile systems, Handoffs, Analog cellular Radio Digital Cellular radio, Digital Narrow band TDMA, CDMA technology. (12L)
(Total:60L)

TEXT BOOKS:

1. Digital Telemetry by John C Bellamy.
2. Telecommunication Switching System and Network by Tyagrajan
3. Telecommunication system Engg. by Roger L.Freeman.
4. Wireless Mobile Communication by Rappapor

COURSE RESULTS: Students should have thorough knowledge of telecommunication devices such as telephones, FAX machines and their working principles.

LINEAR INTEGRATED CIRCUITS LAB

LTPC
0031

OBJECTIVES:

- Provide the experimental knowledge of analog IC's, Amplifiers, filters, Operational Amplifier (OPAMP) characteristics, multivibrators and various OPAMP applications.
1. Inverting and Non-Inverting Amplifier.
 2. Integrator and Differentiator.
 3. Instrumentation Amplifier.
 4. High pass, Low pass filters.
 5. Band pass filter.
 6. Astable multivibrator using OPAMP.
 7. Monostable multivibrator using OPAMP.
 8. Phase shift oscillator using OPAMP.
 9. Wien Bridge oscillator using OPAMP.
 10. Digital to Analog Converter.
 11. Analog to Digital Converter.
 12. Astable Multivibrator using IC555.
 13. Monostable Multivibrator using IC555.
 14. Schmitt Trigger and Comparator using OP-AMP.
 15. Design of light switch using LDR and Relay.

COURSE RESULTS: Practical skills obtained about analog integrated ICs and OPAMPs.

OBJECTIVES:

- To construct and design basic electronic circuits such as rectifiers, amplifiers and oscillators
1. Half waverectifier
 2. Full waverectifier
 3. Construction of power supply using C filter and Zener diode asregulator
 4. Construction of variable power supply usingIC723
 5. Construction of variable power supply usingLM317
 6. Characteristics of Class A PowerAmplifier
 7. Characteristics of Class B PowerAmplifier
 8. Design a Single Stage CEamplifier.
 9. Design of Two stage RC coupledAmplifier.
 10. Darlington pairAmplifier.
 11. Clippingcircuits.
 12. Clampingcircuits.
 13. HartleyOscillator.
 14. Colpitt'sOscillator.
 15. Astable Multivibrator usingBJT.

COURSE RESULTS:Practical skills will be received about basic electronic circuits.

NUMERICAL METHODS

L T P C

OBJECTIVES:

3 0 0 3

- Students will understand the numerical methods, equations and analysis for engineering applications

UNIT I

Numerical solution of algebraic and transcendental equations – Bolzano’s bisection method - Successive approximation method – Regula Falsi method – Newton-Raphson method.

(9L)

UNIT II

Numerical solution of simultaneous linear algebraic equations – Gauss elimination method - Gauss Jordan elimination method – Gauss Seidel iteration method. **(9L)**

UNIT III

Finite difference operator - Interpolation – Newton-Gregory forward and backward interpolation – Newton’s divided difference formula – Lagrange’s interpolation formula for uneven intervals – Gauss interpolation formula – Numerical differentiation – Numerical Integration – Trapezoidal rule – Simpson’s 1/3rd rule.

(9L)

UNIT IV

Numerical solutions of Ordinary differential equations of first and second order – Simultaneous equations – Taylor series method – Picard’s method. **(9L)**

UNIT V

Euler’s method – Improved Euler’s Method - Modified Euler’s Method – Runge-Kutta method of second and fourth order – Milne’s predictor corrector method.

(9L)

(Total: 45L)

TEXT AND REFERENCE BOOKS:

1. Numerical Method in Science and Engineering, M.K.Venkataraman, National Publication Co, Chennai(2001)
2. Computer oriented Numerical Methods by V. Rajaram – PHI(P) Ltd.

e-Learning Source: <http://ndl.iitkgp.ac.in>, <http://ocw.mit.edu>, <http://mathforum.org>

COURSE RESULTS: Students can able to understand numerical methods, problems and their methods for the applications of various science and engineering solutions.

ADVANCED COMMUNICATION SYSTEM

L T P C

3 0 0 3

OBJECTIVES:

- To understand the basic concepts of digital communication systems, fiber optic systems, various wireless networks, cellular communication and satellite communication techniques.

UNIT I

DIGITAL COMMUNICATION: Basic Elements of Digital Communication System – Block Diagram-Characteristics Of Data Transmission Circuits - Bandwidth Requirement – Speed - Baud Rate - Noise -Crosstalk – Distortion. Digital Codes: ASCII Code – EBCDIC Code - Error Detection Codes – Parity Check Codes – Redundant Codes - Error Correction Codes – Retransmission- Forward Error Correcting Code – Hamming Code

(9L)

UNIT II

OPTICAL FIBER COMMUNICATION: Introduction-need for OFC. Block diagram of OFC system. Fiber optic cables, light propagation through fiber-step index fiber, graded index fiber, Snell's law, numerical aperture (derivation). Types of optical fiber cables, light sources-requirements, LEDs and semiconductor laser diodes. Photo detectors -PN, PIN and avalanche photodiodes. Losses in optical fibers -Rayleigh scattering, absorption, leaky modes, bending, joint junction losses. Advantages and disadvantages of OFC over metallic cables.

(9L)

UNIT III

CELLULAR COMMUNICATION: Concept of cellular mobile communication – cell and cell splitting, frequency bands used in cellular communication, absolute RF channel numbers (ARFCN), frequency reuse, roaming and hand off, authentication of the SIM card of the subscribers, IMEI number, concept of data encryption, architecture (block diagram) of cellular mobile communication network, CDMA technology, CDMA overview, simplified block diagram of cellular phone handset, Comparative study of GSM and CDMA, 2G, 3G and 4G concepts.

(9L)

UNIT IV

SATELLITE COMMUNICATION: Introduction, need, satellite orbits, advantages and disadvantages of geostationary satellites. Satellite visibility, satellite system – space segment, block diagrams of satellite sub systems, up link, down link, cross link, transponders (C- Band), effect of solar eclipse, path loss, ground station, simplified block diagram of earth station. Satellite access – TDMA, FDMA, CDMA concepts, comparison of TDMA and FDMA, Satellite antenna (parabolic dish antenna).

(9L)

UNIT V

WIRELESS NETWORKS: Wireless LAN's Major components of local area network- Primary characteristics of Ethernet-mobile IP, OSI model, wireless LAN requirements-concept of Bluetooth, WiFi and WiMAX.

(9L)

(Total:45L)

TEXT AND REFERENCE BOOKS:

1. Advanced Electronic Communication Systems-Wayne Tomasi, PHI 6th edition.
2. Telecommunication Systems –P.H Smale, Wheeler Publication 2nd edition.
3. Optical Fiber Communications-Gerd Kaiser, McGraw-hill 2nd edition.
4. Satellite Communications- Roddy, McGraw-hill 4th edition.
5. Electronic Communication systems, Kennedy & Davis, IVth edition-TATA McGraw Hill.
6. Electronic Communication systems, Fundamentals through Advanced, Wayne Tomasi - 5th edition.

COURSE RESULTS: The outcome of the students could understand various communication techniques and can identify the required system for better communication technique.

Semester – IV / Allied -Practical-4 (for major students)

MATLAB SIMULATION FOR NUMERICAL METHODS

L T P C

0 0 2 1

OBJECTIVES:

- Students will understand the MATLAB programing and numerical methods for various applications

LIST OF PRACTICALS:

1. Write a program to solve algebraic and transcendental equations by Bisection method
2. Write a program to solve algebraic equation and transcendental by Newton-Raphson method
3. Write a program to solve simultaneous linear algebraic equations by Gauss-Jordan method
4. Write a program to find the inverse of a matrix of order n
5. Write a program to find the determinant of a matrix of order n
6. Write a program to solve simultaneous linear algebraic equations by Gauss Seidal
7. Write a program to evaluate definite integral by Trapezoidal rule
8. Write a program to evaluate definite integral by Simpson's 1/3 rule
9. Write a program to solve first order ODE by Euler's method
10. Write a program to solve the first order ODE by Runge Kutta method

e-Learning Source:<http://ndl.iitkgp.ac.in>,

<http://ocw.mit.edu>,

<http://mathforum.org>

COURSE RESULTS:Students can able to well versed with MATLAB programming skills and numerical methods and their problems.

Semester – IV / Allied Practical - 4 (for other major students)

ELECTRONIC COMMUNICATION LAB – II

**LTPC
0041**

The list of experiments is given below:

1. Voltage to frequency converter.
2. Study of AGC (Automatic Gain Control).
3. Study of mixer circuit.
4. Study of IF amplifier.
5. Analog signal sampling and reconstruction
6. Voltage to frequency converter
7. PSK, DPSK and QPSK Modulation and Demodulation
8. PCM modulation and demodulation
9. Delta / Adaptive Delta Modulation and Demodulation
10. PPM / PAM modulation and demodulation
11. Low high power splitter using MATLAB.
12. Band pass and band stop filter using MATLAB.

COURSE RESULTS: Students will be practically well versed with signals, modulation, demodulation, mixer, amplifier, and types of filters.

MAINTENANCE AND TROUBLE SHOOTING OF AUDIO AND VIDEO EQUIPMENTS

**LTPC
4004**

OBJECTIVES:

- To understand the principles of electronic household devices, maintenance and its troubleshooting.

UNIT I

RECORDING: Recording and reproduction principles - Optical recording - Different types - Methods of recording and reproduction - Optical recording on compact disc - play back process - Advantage of compact disc - Trouble shooting in compact disc (12L)

UNIT II

AUDIO SYSTEMS: Stereophony - Stereophonic recording on disc and reproduction - Hi-Fi Stereo reproducing system - Block diagram of Public Addressing system - Requirement of Public Addressing system - Typical PA installation planning for a public meeting - PA system for an auditorium troubleshooting in PA system. (12L)

UNIT III

TELEVISION: Monochrome, PAL colour TV transmitters Faults in TV transmitter - Testing of TV transmissions monochrome TV receiver - Fault in monochrome TV receiver - PAL colour TV receiver - Faults in colour TV receiver - Testing of TV receiver. (12L)

UNIT IV

VIDEO DISC: Video disc format - Video recording on disk - Very High-density disk - High-definition TV system - Block diagram of MAC encoder - MAC receiver - Advantages. (12L)

UNIT V

DIGITAL TV: Digital TV system - Cable TV concepts set top box - Dish TV and connections - Closed circuit television - Introduction to FLAT LCD and Plasma television systems. (12L)

(Total: 60L)

TEXTBOOKS

1. Audio and Video systems Principles, Maintenance and Troubleshooting. - R.G. Gupta Tata Mc Graw Hill PublishingCo.Ltd.
2. Colour Television Theory and Practice - S.P. Bali, Tata Mc Graw Hill Publishing Co.Ltd.

REFERENCE BOOKS

1. Electronic Instruments and systems, Principles, Maintenance and Troubleshooting- R.G. Gupta Tata Mc Graw Hill Publishing Co.Ltd.
2. Monochrome and Colour Television - R. Gulati. New Age International (P) Ltd. New Delhi.

COURSE RESULTS: Students will have good knowledge about the household electronic devices, operation, maintenance and troubleshooting in detail.

Semester – IV / Non major Elective (for other major) / Select any one (1) or (2)

1.INDUSTRIAL CONTROLS

LTPC
2 0 0 2

OBJECTIVES:

- To equip the students with basic knowledge in Industrial devices which has now become a part of every industry. The syllabus aims at a comprehensive coverage of basics of motors, starters, control system, drives, switches, sensors and protective relays.

UNIT I

MOTOR CONTROLS: Starting and speed control of DC Motors-Starting and speed control of AC motors-Automatic regulation system **(6L)**

UNIT II

CONTROL SYSTEM: Elements of automatic control system-Rotary Amplifiers-Magnetic amplifiers-Thyristor control of DC and AC motor Inverters-Cycloconvertors **(6L)**

UNIT III

PHASE CONTROL: Phase control of DC shunt motor-Reversible speed control of DC motor using dual converter- Chopper control of DC series motor-Slip Control-Frequency control-constant speed DC drive **(6L)**

UNIT IV

PILOT DEVICES: Pilot devices and accessories-push button controllers& master switches-rotary selector switches-rotary control switches-over travel and limit switches-Float switches-Pressure switches and regulators-Thermostats or temperature switches-Speed governors. **(6L)**

UNIT V

RELAYS: Plugging switches-contactors-Electromagnetic Relays-Protective relays-Voltage relay- Electromagnetic time relay-control and automation relays-Polarized electromagnetic relay-Construction and operation of electromagnetic relay. **(6L)**
(Total:30L)

TEXTBOOK

- Utilization of Electric Power and Electric Traction-G.C Garg- Khanna Publishers

COURSE RESULTS: Upon completion of the course student will be well versed with motors and their control.

Semester – IV / Non major Elective (for other major) / Select any one (1) or (2)

2. POWER CONVERTERS

LTPC

2002

OBJECTIVES:

- To equip the students with basic knowledge of Industrial power convertors which has now become a part of every industry.
- It aims at a comprehensive coverage of basics of Inverters and their operation.
- Series inverters, Parallel inverters, Converters etc. are also discussed.

UNIT I

DC – AC PWM INVERTERS: DC – AC PWM inverters: Introduction – Principle of operation – performance parameters – Single phase bridge inverters **(6L)**

UNIT II

THREE PHASE INVERTERS: Three-phase inverters – Voltage control of single-phase inverters – Voltage control of three phase inverters – Current source inverters. **(6L)**

UNIT III

RESONANT PULSE INVERTERS: Resonant pulse Inverters: Introduction – Series resonant inverters – Parallel resonant inverters – Zero current Switching resonant converter **(6L)**

UNIT IV

ZVS RESONANT CONVERTER: Zero voltage switching resonant converter – Two quadrant ZVS resonant converter – resonant DC link inverter **(6L)**

UNIT V

CONTROLLED CONVERTER: Principle of phase-controlled converter operation – Single phase full converter – Single phase dual converter **(6L)**

(Total:30L)

TEXT BOOK:

Power electronics – Circuits, devices & Applications – Rashid M.H.

COURSE RESULTS: Students can be able to well-versed with all types of inverters and converters.

Semester – IV / Internship / Field Work

INTERNSHIP / FIELD WORK

L T P C

0 0 3 2

OBJECTIVES:

- To develop skills by visiting nearby industries / organizations.
- Acquire the knowledge and receive guidance from other various tasks or sources of their internship / industrial visits survey or study.

COURSE RESULTS:

1. Formulate and identify the real-world problem, practical difficulties, identify the requirement and develop the solutions according to their field work or internship study.
2. Identify technical ideas, strategies and methodologies.
3. Utilize the new tools, algorithms, techniques that contribute to obtain the solution of the work.
4. Explain the acquired knowledge through preparation of report and oral presentations.

This can be a group activity with a maximum of 5 students in one group. Students are advised to select their own internship / field work study as per the expert guidance receive from the teaching faculties of their own organization. Periodical assessment may be done to evaluate their skills.

ADVANCED MICROPROCESSORS

LTPC
4004

OBJECTIVES:

- To understand microprocessor and microcontroller architectures, assembly language programming, interrupts, interfacing with various peripherals, timer applications and their features.

UNIT I

8085 ARCHITECTURES: Architecture of 8085 -Instruction set – Data Transfer, Arithmetic, Logical, Branching and I/O Instruction, Instruction types- various Addressing Modes. Timing sequence- Instruction cycle- Machine cycle- Halt wait state-. ALP- Mnemonic - simple Assembly language program flow chart stack and subroutines- Interrupts. (12L)

UNIT II

INTERFACE CONTROLLERS: Peripheral device – Programmable peripheral Interface (8255 A) - Programmable Interrupt controller (8259 A) - USART- Serial Communication Interface. Programmable DMA Controller (8257), Interfacing –Analog to Digital Converter- Stepper Motor – Key Board & Display Interface. (12L)

UNIT III

8051 MICROCONTROLLERS: Intel 8051 microcontroller – Block Diagram, pin out – oscillator and clock – Program Counter and Data pointer, A and B registers, flags and program status word – Internal RAM – the Stack and Stack pointer –special functions registers – Internal ROM – I/O Pins, ports and circuits – External memory. Counters, Timers and Addressing Modes. (12L)

UNIT IV

8051 INSTRUCTIONS: Data exchanges – Logical operations – Byte level operation – Bit level logical operations – Rotate and swap operations – Arithmetic operations – Jump and call instructions – Jump and call program range – Jumps – Calls and subroutines – Interrupts and return. (12L)

UNIT V

8051 PROGRAMMING: Assembly Language programming for 8051 Micro controller family – Programs 8–Bit addition – 8–Bit subtraction – 8–Bit Multiplication – 8–Bit Division - Greatest and smallest number in an array – ascending and Descending –Interfacing Keyboard– Interfacing LED, LCD Display– A/D and D/A Interfacing. (12L)

(Total:60L)

TEXT BOOKS:

1. Microprocessor and Interfacing: Programming and Hardware, Douglas V.Hall, McGrawHill, New York(1988)
2. Microprocessor Architecture Programming and applications with 8085/ 8080A. S.RameshGoankar, Wiley Eastern Limited(1986)
3. Digital systems & Microprocessor Douglas V.Hall, McGrawHill.
4. Microprocessor- Srinath, PHILtd.
5. 8051 Micro controller Architecture, Kenneth J. Ayala, Programming and Applications, Penram International Publishing
6. Microprocessor Principles and Applications – 2nd Edition, Gilmore – Tata McGrawHill.

COURSE RESULTS: Students can able to execute microprocessor and microcontroller programs and its applications using assembly language. Able to illustrate how the different peripherals (8255, 8279, 8253, 8237, 8251) are interfaced with microprocessor. able to design, develop and interface complete microcontroller-based systems to peripheral devices using 8051 microcontrollers.

COMMUNICATION SYSTEMS

LTPC

4004

OBJECTIVES:

- This paper deals with the basic concepts of communication systems, transmitter and receiver.
- To understand analog modulation and demodulation techniques.
- To analyze the adverse effect of noise on signals.

UNIT I

INTRODUCTION: Communication systems – Modulation - need for modulation- bandwidth- Amplitude modulation - theory- mathematical representation- frequency spectrum - USB & LSB- power relation- Frequency modulation - theory- mathematical representation- frequency spectrum- Phase modulation- comparison of AM- FM- PM. (12L)

UNIT II

RADIO TRANSMITTERS: AM transmitter - block diagram - Solid state modulators - circuit explanation- FM transmitter - reactance modulator- varactor diode modulator- Amstrong modulator. (12L)

UNIT III

RADIO RECEIVERS: Tuned radio frequency receiver- superheterodyne receiver - block schematic- selectivity- sensitivity- importance of IF - image frequency rejection - AM receivers - schematic explanation - RF amplifiers - circuit explanation - Mixer circuits - IF amplifiers - circuit explanation- simple diode detector - Automatic gain control circuit - simple and delayed AGC - FM receivers - block schematic explanation - amplitude limiting - FM demodulators: slope detectors- phase discriminator- ratio detectors. (12L)

UNIT IV

SIDE BAND COMMUNICATION: Single side band transmission - suppression of carrier - balanced modulator - filtering of unwanted sideband - SSB receivers - block schematic explanation - pilot carrier receiver - suppressed carrier receiver - Vestigial side band transmission - transmitter and receiver responses - advantages of VSB in television. (12L)

UNIT V

TELEPHONE SYSTEMS: Telephone subscribers loop circuit - subscriber's line interface circuit - Pulse and tone signaling - Frequency assignments - Electronic telephone - block schematic of a telephone set- block schematic of single line analog SLIC board - two wire repeaters - Electronic private automatic branching exchange - basic block schematic- Power line communication: block schematic explanation- Facsimile - FAX transmitter and receiver(12L)

(Total:60L)

TEXT BOOKS:

1. Electronic communication Systems: Wayne Tomasi- Pearson Edn.
2. Electronic communication: Roody and Coolen- PHI.
3. Electronic Communication systems: George Kennedy- Mc Graw Hill.
4. Electronic and radio engineering: A P Mathur.
5. Telephony and Carrier current engineering: P N Das.
6. Modern communication Systems: Couch- PHI.

COURSE RESULTS: Students can identify the required system for a better communication technique. Analyze and interpret data considering the limitations of various modulation techniques. Employ the appropriate modulators and demodulators for transmitters and receivers.

INTERNET OF THINGS (IOT) BASED APPLICATIONS

**LTPC
4 0 0 4**

OBJECTIVES:

- Understand the basics of IOT and how it is connected to devices for any applications.
- Acquire knowledge to interface sensors and actuators with microcontroller-based Arduino platform.
- Writing C programs in Arduino Integrated Development Environment (IDE).
- Understand the Communication between microcontroller and PC using serial communication and build the IoT based applications.

UNIT I

INTRODUCTION TO INTERNET OF THINGS (IOT): Introduction - Overview of Internet of Things (IoT), the characteristics of devices and applications in IoT ecosystem, building blocks of IoT, Various technologies making up IoT ecosystem, IoT levels, IoT design methodology, The Physical Design/Logical Design of IoT, Functional blocks of IoT and Communication Models, Development Tools used in IoT. **(12L)**

UNIT II

THINGS AND CONNECTIONS: Working of Controlled Systems, Real-time systems with feedback loop e.g. thermostat in refrigerator, AC, etc. Connectivity models – TCP/IP versus OSI model, different type of modes using wired and wireless methodology, The process flow of an IoT application. **(12L)**

UNIT III

SENSORS AND ACTUATORS: Sensor - Measuring physical quantities in digital world e.g. light sensor, moisture, sensor, temperature sensor, etc. Actuator – moving or controlling system e.g. DC motor, different type of actuators

(12L)

UNIT IV

MICROCONTROLLERS: Controller – Role of microcontroller as gateway to interfacing sensors and actuators, microcontroller vs microprocessor, different type of microcontrollers in embedded ecosystem.

(12L)

UNIT V

APPLICATIONS OF IOT: Introduction to Arduino IDE – writing code in sketch, compiling-debugging, uploading the file to Arduino board, role of serial monitor. Embedded ‘C’ Language basics - Interfacing sensors – The working of digital versus analog pins in Arduino platform, interfacing LED, Button, Sensors-DHT, LDR, MQ135, IR. Display the data on Liquid Crystal Display (LCD), interfacing keypad serial communication – interfacing HC-05 (Bluetooth module)- Control/handle 220V AC supply – interfacing relay module. **(12L)**

(Total: 60L)

TEXT AND REFERENCE BOOKS:

1. Macro Schwartz, "Internet of Things with Arduino- Cookbook", Packt 2016.
2. ArshdeepBajga and Vijay Madiseti, "Internet of Things- A Hands-onApproach" Universities Press, 2014.
3. Massimo Banzi, "Getting started with Arduino", 2nd Edition, Oreilly, 2011[Make:Makezine.com]
4. Macro Schwartz, "Internet of Things with Arduino", Open Home Automation
5. Michael Margolis, "Arduino Cookbook", Oreilly, 2011

COURSE RESULTS: To equip the students to understand the basics of IoT and its applications. IoT primarily refers to theconnected and smarter world having physical and virtual objects with some uniqueidentities. IoT applications span across various domains from agriculture to tech. industry.

MOBILE COMMUNICATION

LTPC
4004

OBJECTIVES:

- To provide the basic foundation of mobile communication and understand the cellular design concepts
- To design a 2G and 3G wireless communication system to meet desired needs within realistic constraints.
- Understand GSM and CDMA technologies of mobile communication.

UNIT I

CELLULAR MOBILE SYSTEM: Introduction to Cellular Mobile System, Performance criteria, uniqueness of mobile radio environment, operation of cellular systems, Hexagonal shaped cells, Analog and Digital Cellular systems, General description of the problem, concept of frequency channels, Co- channel Interference Reduction Factor, desired C/I from a normal case in an omni directional Antenna system, Cell splitting, consideration of the components of Cellular system.

(12L)

UNIT II

CO-CHANNEL INTERFERENCE: Introduction to Co-Channel Interference, real time Co-Channel interference, Co-Channel measurement, design of Antenna system, Antenna parameters and their effects, diversity receiver, non-co channel interference-different types, Signal reflections in flat and hilly terrain, effect of human made structures, phase difference between direct and reflected paths, constant standard deviation, straight line path loss slope, general formula for mobile propagation over water and flat open area, near and long distance propagation antenna height gain, form of a point to point model.

(12L)

UNIT III

ANTENNAS: Sum and difference patterns and their synthesis, omni directional antennas, directional antennas for interference reduction, space diversity antennas, umbrella pattern antennas, minimum separation of cell site antennas, high gain antennas, Numbering and grouping, setup access and paging channels channel assignments to cell sites and mobile units, channel sharing and borrowing, sectorization, overlaid cells, non-fixed channelassignment, Handoff, dropped calls and cell splitting, types of handoff, handoff invitation, delaying handoff, forced handoff, mobile assigned handoff. Intersystem handoff, cell splitting, micro cells, vehicle locating methods, dropped call rates and their evaluation.

(12L)

UNIT IV

2 G AND 3 G NETWORKS: Second generation and Third generation Wireless Networks and Standards, WLL, Bluetooth, GSM, IS-95, DECT, GSM architecture, GSM channels, multiplex access scheme, TDMA, CDMA.

(12L)

UNIT V

INTELLIGENT CELL CONCEPT: Intelligent Cell Concept, Advanced Intelligent Network, SS7 Network and ISDN for AIN, AIN for Mobile communication, Asynchronous Transfer, Mode Technology, Future Public Land Mobile Telecommunication System, Wireless Information Superhighway.

(12L)

(Total: 60L)

TEXT BOOKS:

1. W.C.Y. Lee, "Mobile Cellular Telecommunications", 2nd Edition, TataMcGrawHill, 2006.
2. Gordon L. Stuber, "Principles of Mobile Communications", 2nd Edition, Springer International, 2000.
3. Theodore. S. Rapport, "Wireless Communications", 3rd Edition, Pearson Education, 2003.
4. Lee, "Wireless and Mobile Communications", 3rd Edition, McGraw Hill, 2006.
5. Jon W. Mark and WeihuaZhqung, "Wireless Communication and Networking", PHI, 2005.
6. R. Blake, "Wireless Communication Technology", Thompson Asia Pvt. Ltd., 2004.

COURSE RESULTS: Students could understand the concepts and techniques of mobile, radio communication fundamentals like reflection, diffraction, scattering and fading. Know various multiple access techniques and fundamentals of equalization in wireless communication.

ADVANCED MICROPROCESSOR LAB

LTPC
0031

OBJECTIVES:

- To provide an opportunity to learn and execute assembly language programs for microprocessors and microcontrollers

A. Microprocessor Lab

1. Program for 8 Bit Addition and subtraction
2. Program for 16 Bit Addition and subtraction
3. Program for 8 Bit Multiplication and division
4. Program for 16 Bit Multiplication and division
5. Program for Square and Square root of a number
6. Program for Sorting and Searching
7. Program for Smallest and Largest number in an array.
8. Program for Reversing a String
9. Program for Fibonacci series.
10. Program for Factorial of a number
11. Program for B.C.D to Binary, Binary to B.C.D, ASCII to Binary,
12. Binary to ASCII Conversion
13. Six letter word display.
14. Rolling display
15. Interfacing seven segment displays to display any character.
16. Program to display Time (Hours and Minutes)
17. Program for 1's complement and 2's complement of 8 bit and 16-bit data
18. Interfacing Traffic light controller
19. Interfacing Stepper motor control
20. Interfacing Matrix Keyboard
21. Interfacing A.D.C
22. Interfacing D.A.C
23. Study of 8255 chip and generation of
 1. Square wave
 2. Triangular wave
 3. Saw Tooth wave

B. Microcontroller 8051Lab

1. Addition – 8-bit, 16bit.
2. Subtraction – 8-bit, 16bit.
3. Multiplication 8bit
4. Division 8bit
5. Array addition(multibyte)
6. Logical Operations – AND, OR, NOT
7. Decimal to ASCII and ASCII toDecimal.
8. Decimal to Hexa and Hexa toDecimal.
9. AscendingOrder.
10. DescendingOrder
11. Up/downCounter
12. Block datatransfer
13. Interfacing withLCD.
14. Interfacing with MatrixKeypad.
15. Square wavegenerator
16. Interfacing withADC.
17. Interfacing withDAC.
18. DigitalClock.
19. Interfacing with StepperMotor.

COURSE RESULTS: Students can familiarize with assembly-level language programs formicroprocessors and microcontrollers

Semester – V / Core -Elective – 1. Select any one (1) or (2)

1. OPTICAL DISPLAY APPLICATIONS

LTPC 4
004

OBJECTIVES:

- Acquires the knowledge of optical fabrication technology to various optical display applications

UNIT I

THIN FILM TECHNOLOGY: Thin film deposition techniques thermal/electron beam evaporation, RF/DC sputtering, Ion beam sputtering, pulsed laser beam deposition. Thickness monitoring: Optical and quartz micro-balance techniques monitoring techniques. Display Glasses, Inorganic Semiconductor TFT Technology, Organic TFT Technology, Transparent Conductors, Patterning Processes: Photolithography for Thin Film LCD, Wet Etching, Dry Etching; Flexible Displays (12L)

UNIT II

OPTICAL TRANSMITTER: Basic concepts, characteristics of semiconductor injection LASER, LED, transmitter design and **OPTICAL RECEIVER:** Basic concepts, p-n and pin photo detectors, Avalanche photo detectors, MSM photo detector, receiver design, receiver noise, receiver sensitivity, optical amplifier and its applications. Photo transistors, solar cells, CCDs, IR and UV detectors.

(12L)

UNIT III

OPTICAL SENSORS: Photometry and Radiometry, Radiation Sources and characteristics. Detectors-Imaging and non-imaging (Thermal detectors, Photon detectors, Detector arrays: CCDs, CID, FLIR etc.) and their characteristics (12L)

UNIT IV

DISPLAY TYPES:Inorganic Phosphors, Cathode Ray Tubes (CRTs), Vacuum Florescent Displays, Field Emission Displays; Plasma Display Panels, LED Display Panels; Inorganic Electroluminescent Displays: Thin Film Electroluminescent Displays, AC Powder Electroluminescent Displays; Organic Electroluminescent Displays (OLEDs), Liquid Crystal Displays (LCDs) (12L)

UNIT V

EMERGING DISPLAYS:Paper like and Low Power Displays: Colorant Transposition Displays, MEMS based displays, 3-D Displays, 3-D Cinema Technology, Autostereoscopic 3-D Technology, Volumetric and 3-D Volumetric Display Technology, Holographic 3-D Technology; Mobile Displays, Energy Aspects of Mobile Display Technology.

(12L)

(Total: 60L)

COURSE RESULTS:This subject helps the students to know about optical applications especially for displays.

TEXT AND REFERENCE BOOKS:

1. Principles of optics, Born and Wolf, SPIE milestone series on-Design of optical coatings
2. Practical Design and Production of Optical Thin Films – Second Edition – Ronald Ron Wiley –CRC Press – 2002
3. Fundamentals of Space Systems by Vincent L. Pisacane, Oxford University Press, 2005
4. Optical fiber communications- Gerd Keiser-McGraw Hill, 3 ed
5. CCD arrays, Cameras & Displays-Gerald C Hoist 1998 [2nd Ed], JCD Publishing-SPIE Optical Engg.Press
6. Janglin Chen, Wayne Cranton, Mark Fihn , “Handbook of Visual Display Technology”, Springer Publication

Semester – V / Core -Elective – 2. Select any one (1) or (2)

2. VERY LARGE-SCALE INTEGRATION (VLSI) TECHNOLOGY

LTPC
4004

OBJECTIVES:

- This paper is to study about the MOS Transistor and its characteristics.
- To get familiarized with stick diagrams and Layout design.
- To understand the CMOS logic design styles, latches and registers.
- The students will learn MOSFET, CMOS, and IC Fabrication Process Prerequisite for this paper is basic physics and electronics.

UNIT I

INTRODUCTION TO MOSFET: Structure of MOSFET: Enhancement mode MOSFET- Depletion Mode MOSFET – MOS Transistor Theory: Figure of merit-MOS Device design equations-equivalent circuits of MOSFETS- Basic structure of CMOS-Solved examples. (12L)

UNIT II

BASIC MOS & CMOS AND BIPOLAR LOGIC CIRCUITS: Pass Transistor (or) Transmission gate- Inverters: The nMOS Inverter-MOSFET as a resistance-determination of pull-up to pull-down ratio for an n-MOS inverter by another n- MOS inverter-pull-up to pull-down ratio for an n-MOS inverter driven through one or more pass transistors-Different forms of pull-up-BICMOS Inverter – Tristate Inverter –Differential Inverter-Bipolar logic circuits- DTL- ECL- Integrated injection logic (12L)

UNIT III

VLSI FABRICATION PROCESS: Crystal growth and wafer preparation-epitaxy-oxidation-diffusion: Constant source diffusion- limited source diffusion-Parameters affect diffusion-Diffusion Systems- Diffusion Furnace - Ion Implementation- lithography-Dielectric and polysilicon Film Deposition-Etching – Metallization-Yield and reliability (12L)

UNIT IV

FABRICATION OF TYPICAL IC COMPONENTS: Monolithic Resistors-Monolithic Capacitors-Monolithic Diodes-Monolithic Transistors-An overview of MOSFET technology-CMOS Technology-Solved Examples (12L)

UNIT V

APPLICATION OF CMOS: An Increment/Decrement Circuit-Shift Registers: Left/Right Register- Serial Parallel Registers-Comparators for a two-bit number- Two Phase non-Overlapping clock generator (12L)

(Total: 60L)

TEXT AND REFERENCE BOOKS:

1. Dilip K. Roy, Principles of VLSI, Galgotia Publication Limited, 2005
2. Neil H. E. Weste, Principles of CMOS VLSI Design, Addison-Wesley Publishing Company, 1993
3. Introduction to VLSI Systems Carver Mead Lynn Conway BS Publication, 2003

COURSE RESULTS: Students received a knowledge on MOS transistor structure and its characteristics. Gain knowledge on design rules and layout. Understand CMOS circuit design using the various logic styles.

Semester – V / Core -Mini project

MINI PROJECT

**LTPC
0053**

OBJECTIVES:

1. To develop skills to formulate a technical project.
2. To give guidance on the various tasks of the project and standard procedures.
3. To teach use of new tools, algorithms and techniques required to carry out the projects.
4. To give guidance on the various procedures for validation of the product and analyze the cost effectiveness.
5. To provide guidelines to prepare technical report of the project.

COURSE RESULTS:

1. Formulate a real-world problem, identify the requirement and develop the design solutions.
2. Identify technical ideas, strategies and methodologies.
3. Utilize the new tools, algorithms, techniques that contribute to obtain the solution of the project.
4. Perform test and validate through conformance of the developed prototype and analysis the cost effectiveness.
5. Explain the acquired knowledge through preparation of report and oral presentations

Mini Project shall be a group activity with a maximum of FIVE students in a group. Students are advised to select topics of their own interest in hardware and develop their hardware skills by designing a circuit of their own. Periodical assessment may be done to evaluate their skills.

ANTENNAS

LTPC
4004

OBJECTIVES:

- This course is to provide an in-depth understanding of modern antenna concepts and practical antenna design for various applications.
- The course will explain the theory of different types of antennas used in communication systems.

UNIT I

FUNDAMENTAL CONCEPTS: Definitions-Radiation Intensity-Directive Gain-Directivity-Power Gain-Beam Width-Gain and Radiation resistance of current element-Half wave Dipole and Folded Dipole-Reciprocity Principle-Effective length and effective area-Radiation Pattern-Field zone.

(12L)

UNIT II

ANTENNA ARRAYS: Introduction, Various forms of Antenna Arrays, Broad side and End Fire Array, Array of Point Sources-Field of two isotropic point sources-Principle of pattern multiplication- Linear arrays of n isotropic point sources- Principle of Log periodic antenna arrays and Helical antenna.

(12L)

UNIT III

DESIGN OF ANTENNAS: Long wire, V antenna, Loop antenna, Rhombic antenna, Yagi uda antenna, Horn antenna, Microstrip antenna, Parabolic Reflector antenna.

(12L)

UNIT IV

ANTENNAS FOR MODERN WIRELESS COMMUNICATIONS: Antennas for Terrestrial mobile communication-Mobile handsets and base stations, Antennas for Satellite Communication-Spiral antenna, Lens antenna, Reconfigurable antenna.

(12L)

UNIT V

ANTENNA MEASUREMENTS: Impedance (Input) measurement, Radiation measurement, Measurement of Gain, Measurement of antenna efficiency and Directivity, current and phase measurement- Polarization measurement.

(12L)

(Total: 60L)

TEXT BOOKS:

1. Antenna & Wave propagation – K D Prasad. Sathya Prakashan, New Delhi 2004.
2. G.S.N Raju, Antennas and Wave Propagation, Pearson Education, 1st Edition, 2006 New Delhi.

COURSE RESULTS: Students can understand the basics concept of antennas, principle, radiation pattern of antenna, design and antenna measurements.

OPTICAL FIBER COMMUNICATION

LTPC
4004

OBJECTIVES:

- It provides various optical fiber modes, configurations and various signal degradation factors
- Studies about various optical sources and optical detectors and their use in the optical communication system.
- Understand the different kind of losses, signal distortion in optical wave guides and other signal degradation factors.
- Learn the various optical source materials, LED structures, quantum efficiency, and laser diodes. Learn the fiber optical receivers such as PIN, APD diodes, noise performance in photo detector, receiver operation and configuration.
- Understand the fiber optical network components, variety of networking aspects, Measure various parameters in fiber networks.

UNIT I

BASIC PRINCIPLES OF OPTICS: Recollection of basic principles of optics: ray theory- reflections at boundary- critical angle- total internal reflection - Optical wave guides - Propagation in fiber- expression for acceptance angle-acceptance cone – numerical aperture- V number - Index profile-effect of index profile on propagation. (12L)

UNIT II

FIBER: SI fiber and GI fiber - Brief description of modes in SI fiber and GI fiber- Pulse dispersion and Band Width limitation- Mode coupling – Attenuation in single mode and multimode fibers- Optic fiber cables- characteristics of cables- Optic fiber couplers: types of coupling – fiber to fiber joints- splicing techniques- optical fiber connectors. (12L)

UNIT III

OPTICAL SOURCES: Optical sources- LEDs, LASER diodes- operating characteristics- photo-detectors-principles of photo detection – PIN diode – APD – operating principles – photo-multiplier tubes- source to fiber power launching – lensing schemes- modulation circuits. (12L)

UNIT IV

BASIC OPTICAL COMMUNICATION SYSTEMS: Basic optical communication systems- point-to-point link- rise time budget- protection techniques- WDM – transceiver requirements- TDM- optical amplifiers- SOAs – EDFAs- optical receivers- Introduction to optical fiber networks. (12L)

UNIT V

MEASUREMENTS: OTDR - Measurements- numerical aperture- dispersion measurements- refractive index profile measurements- band width measurements- fiber attenuation measurements- cutoff wave length measurements- applications of fiber optic systems- future developments. (12L)

(Total: 60L)

TEXT AND REFERENCE BOOKS:

1. Fiber optic communication technology: Djafer K Mynbaev, Pearson Education.
2. Electronic communication: Dennis Roddy & John coolen, PHI.
3. Optic fiber communication: John M senior, PHI.
4. Telecommunication principle circuits Systems and experiments: S.Ramabhadran, Khanna.
5. Optical communication system: John Gower, PHI
6. Fiber optics in telecommunication: Sharma, Mc Graw Hill
7. Optical fiber and fiber optic communication: Subir Kumar Sarkar, S Chand & co. Ltd
8. Optical communication: M Mukund Rao, Universities press.
9. Fiber Optic Communication: Palais, Pearson Education.

COURSE RESULTS:The students could learn the basic elements of optical fiber transmission link, fiber modes, configurations and structures.

ARTIFICIAL INTELLIGENCE

LTPC 4
0 0 4

OBJECTIVES:

- Acquire the knowledge on intelligent agents and problem solving by various search strategies, acquire knowledge on uncertain knowledge representation and various learning techniques.
- Apply planning and reasoning algorithms for solving real life problems

UNIT I

INTELLEAGENT AGENTS AND PROBLEM SOLVING: Introduction – Agents and environments, good behavior: The concept of rationality, the nature of environments, the structure of agents, problem solving agents, example of problems, searching for solutions, uninformed search strategies, avoiding repeated states, searching with partial information.

(12L)

UNIT II

SEARCH METHODS: Informed search and exploration: Informed (Heuristic) search strategies, Heuristic functions, local search algorithms and optimization problems, local search in continuous spaces, online search agents and unknown environments, Generic algorithms for TSP. Constraint satisfaction problems: Constraint satisfaction problems, backtracking search for CSPs, Local search for constraint satisfaction problems, structure of problems.

(12L)

UNIT III

PLANNING: Representing actions, situation calculus, classical planning algorithms. The planning problem, planning with state-space search, Partial-order planning, planning graphs, planning with prepositional logic, Analysis of planning approaches. Planning and acting in the real-world time, Schedules and Resources, Hierarchical Task Network Planning, Planning and Acting in Nondeterministic domains, Conditional planning, execution monitoring and replanning, Continuous planning, multi-agent planning.

(12L)

UNIT IV

UNCERTAIN KNOWLEDGE AND REASONING: Acting under uncertainty, Basic probability notation, representing knowledge in n uncertain domain, the semantics of Bayesian Networks, efficient representation of conditional distributions, Exact Inference in Bayesian Networks, Approximate Inference in Bayesian Networks, Extending probability to First-order representations, other approaches to uncertain reasoning.

(12L)

UNIT V

LEARNING: Inductive learning for classification, decision-tree induction, neural-networks: representation and training

(12L)

(Total: 60L)

TEXT BOOKS:

1. Stuart Russell, Peter Norvig, “Artificial Intelligence – A modern approach”, Pearson publication, 2nd Edition, 2002.
2. Jeff Heaton, Artificial Intelligence for Humans – Fundamental Algorithms, Create space Independent Pub; 1st edition, 2013.
3. Nils. J. Nilsson, Artificial Intelligence: A New synthesis, Morgan Kaufmann 1998.

COURSE RESULTS: Solving the real-life problems

COMPUTER NETWORKS

LTPC
4004

OBJECTIVES:

- To provide basic knowledge of computer networks, switching, protocol, types of layers software defined networks and their applications.
- High reliability and resource sharing is the most important one.

Unit- I

Data Communications: Components, protocols and standards, Network and Protocol Architecture, Reference Model ISO-OSI, TCP/IP-Overview, topology, transmission mode, digital signals, digital to digital encoding, digital data transmission, DTE-DCE interface, interface standards, modems, cable modem, transmission media- guided and unguided, transmission impairment, performance, wavelength and Shannon capacity. Review of Error Detection and Correction codes. (12L)

Unit-2

Data Link Layer: Design issues, Data Link Control and Protocols: Flow and Error Control, Stop-and-wait ARQ. Sliding window protocol, Go-Back-N ARQ, Selective Repeat ARQ, HDLC, Point-to-Point Access: PPP Point-to-Point Protocol, PPP Stack

Medium Access Sub layer: Channel allocation problem, Controlled Access, Channelization, multiple access protocols, IEEE standard 802.3 & 802.11 for LANS and WLAN, high-speed LANs, Token ring, Token Bus, FDDI based LAN, Network Devices-repeaters, hubs, switches bridges.

(12L)

Unit-3

Network Layer: Design issues, Routing algorithms, Congestion control algorithms,

Host to Host Delivery: Internetworking, addressing and routing, IP addressing (class full & Classless), Subnet, Network Layer Protocols: ARP, IPV4, ICMP, IPV6, ICMPV6. (12L)

Unit- 4

Transport Layer: Process to Process Delivery: UDP; TCP, congestion control and Quality of service.

Application Layer: Client Server Model, Socket Interface, Domain Name System (DNS): Electronic Mail (SMTP), file transfer (FTP), HTTP and WWW. (12L)

Unit-5

Switching and Software Defined Networks: Circuit switching (space-division, time division and space-time division), packet switching (virtual circuit and Datagram approach), message switching.

Software Defined Networking (SDN) – Modern Data Center – Traditional Switch Architecture – Evolution of SDN –SDN operations. (12L)

(Total: 60L)

TEXT AND REFERENCE BOOKS:

1. S. Tannenbum, D. Wetherall, “Computer Networks”, Prentice Hall, Pearson, 5thEd.
2. Behrouz A. Forouzan, “Data Communications and Networking”, Tata McGraw-Hill, 4th Ed.
3. Larry Peterson Bruce Davie, “Computer Networks: A system Approach”, Fifth Edition, The Morgan Kaufmann Series in Networking- Publisher, 2011.
4. Paul Goransson and Chuck Black, “Software Defined Networks: A comprehensive Approach”, First Edition, Morgan Kaufmann, 2014.
5. Thomas D. Nadeau, Ken Gray, “SDN: Software Defined Networks”, O’Reilly Media, 2013.

COURSE RESULTS:Students will understand the computer networks and their applications. They will have good knowledge on network applications, performance of computer resource sharing and their workloads.

COMMUNICATION SYSTEM AND SYSTEM DESIGN LAB

LTPC

0 0 31

OBJECTIVES:

- To provide the practical skills of communication system with the hands-on training on soldering for system design

All experiments have to be carried out compulsorily from A and B

A. Communication Lab

1. Amplitude modulation and Demodulation.
2. Frequency Modulation and Demodulation
3. Pulse Modulation – PAM / PWM / PPM
4. Pulse Code Modulation
5. Delta Modulation, Adaptive Delta Modulation.
6. Digital Modulation & Demodulation – ASK, PSK, QPSK, FSK
7. Designing, Assembling and Testing of Pre-Emphasis / De-emphasis Circuits.
8. PLL and Frequency Synthesizer
9. Line Coding
10. Error Control Coding using MATLAB.
11. Sampling & Time Division Multiplexing.
12. Frequency Division Multiplexing

B. Electronics Design Lab Practical

Students must use dotted boards or Group boards and interconnect the joints by soldering.

Soldering Practice

1. Design and construction of fixed voltage power supply
2. Design and construction of Dual power supply
2. Design and construction of switching power supply
3. Design and construction of 1.5 to 12 V power supply using multi tap transformer.
4. Design and construction of Burglar alarm using L.D.R
5. Design and construction of Temperature switch using Thermistor
6. Design and construction of Light sensitive switch using Photo diode
7. Design and construction of Audio amplifier using LM 380
8. Design and construction of Timer circuit
9. Design and construction of Decade counter/ seven segment decoder
10. Design and construction of Logic probe

COURSE RESULTS: Students are well versed with communication lab skills and the hands-on training of soldering for system design

Semester – VI / Core -Elective – 2 / Select any one (1) or (2)

1. PRINTED CIRCUIT BOARD (PCB)

LTPC
4004

OBJECTIVES:

- To give a fundamental knowledge of Printed Circuit Board (PCB)s layout planning and design for special circuits.

UNIT I

PCB BASICS: Advantages of PCB's – Components of a PCB – PCB Classification – Manufacturing of PCB's. Layout Planning: Electrical Design Considerations – Conductor Patterns – Component Placement Rules. Design Rules for Analogue, Digital and Power Electronic Circuits.

(12L)

UNIT II

ARTWORK GENERATION AND IMAGE TRANSFER: Basic Approach to Manual Artwork – Guidelines for Artwork Preparation – Artwork Generation Guidelines. Laminates: Anatomy, Properties and Types. Image Transfer Techniques: Laminate Surface Preparation – Screen Printing – Pattern Transferring Techniques – Printing Process – Photo Printing.

(12L)

UNIT III

PLATING, ETCHING AND MECHANICAL OPERATIONS: Electroplating Process – Plating Techniques – Problems in Plating. Etching Techniques: Etching Solutions and Chemistry – Etching Arrangements – Equipment and Techniques – Etching Problems. Mechanical Operations: Need – Cutting Methods – Hole Punching – Drilling.

(12L)

UNIT IV

FLEXIBLE PCB'S AND SOLDERING: Construction of Flexible PCB's – Rigid Flex PCB's – Terminations – Advantages – Special Applications. Soldering: Theory – Variables – Materials – Soldering and Brazing – Soldering Tools – Hand Soldering – Mass Soldering – Post Soldering and Cleaning – Rework and Repair of PCB's.

(12L)

UNIT V

ENVIRONMENTAL CONCERNS: Pollution Control in PCB Industry – Pollution Agents – Recycling of Water – Recovery Techniques – Air Pollution – Recycling of PCB's – Environmental Standards – Safety Precautions – Toxic Chemicals.

(12L)

(Total: 60L)

TEXT BOOKS:

1. R S Khandpur - Printed Circuit Boards: Design, Fabrication, Assembly and Testing – McGraw Hill, India – 2005
2. Christopher T. Robertson - Printed Circuit Board Designer's Reference: Basics – Prentice International, U.S. – 2004
3. PCB Design & Fabrication – Walter.C. Bosshart – TMH

COURSE RESULTS: Students understood about PCB design, manufacturing, characteristics, various types, tests and its application.

Semester – VI / Core -Elective – 2 / Select any one (1) or (2)

2. EMBEDDED SYSTEM AND RTOS

LTPC
4004

OBJECTIVES:

- Students must understand the design and development process of embedded systems and their Real Time Operating System (RTOS).
- To know how to integrate embedded hardware, software, and operating systems to meet the functional requirements of embedded applications.

UNIT I

INTRODUCTION TO EMBEDDED SYSTEMS: Embedded systems - Application of Embedded Systems - processors in the system - Other Hardware units - software embedded to a system - Exemplar embedded system - Embedded system – on - chip (SOC) and in VLSI circuit.

(12L)

UNIT II

DEVICES AND BUSES FOR DEVICE NETWORK:I/O Device - timer and counting devices - serial communication using I2C, CAN and USB. Parallel communication using PCI, PCIX and advanced parallel High-Speed Buses.

(12L)

UNIT III

DRIVERS FOR DEVICE AND INTERRUPTS SERVING MECHANISM: Device drives-parallel port devices drive in a system, serial port Device Drivers in a system, Drivers for internal programmable timing Devices – Interrupt servicing Mechanism – Context and the periods for context switching, Deadline and Interrupt Latency.

(12L)

UNIT IV

EMBEDDED SOFTWARE DEVELOPMENT USING IDE: Introduction to Integrated development environment (IDE) – programming concepts and embedded programming in Assembly and C – creating a New project – Adding Files to a project – Building a project – Debugging and simulating the application – Getting Embedded software into the Target system.

(12L)

UNIT V

REAL TIME OPERATING SYSTEM (RTOS): Introduction to basic concepts of RTOS, Basics of real time & embedded system operating systems, RTOS-Interrupt handling, task scheduling; embedded system design issues in system development process-Action plan, use of target system, emulator, use of software tools.

(12L)

(Total: 60L)

TEXT BOOKS

1. Rajkamal, "Embedded System-Architecture, Programming, Design", Tata Mc Graw Hill 2006.
2. Daniel W. Lewis "Fundamentals of Embedded Software" Prentice Hall of India, 2004.

REFERENCE BOOKS

1. David E Simon, An Embedded Software Primer|| person Education Asia, 2006.
2. Frank Vahid, Embedded System Design – A Unified hardware & Software Introduction John Wiley, 2002.
3. Sriram V. Iyer, Pankaj Gupte, "Embedded Real Time Systems Programming", Tata Mc Graw Hill, 2004.
4. Steve Heath, " Embedded System Design - II edition, Elsevier, 2003.
5. Arnold Berger, Embedded System Design: An Introduction to processes, Tools, and Techniques, CMP Books, 2001.
6. Wayne Wolf, Computers as components|| Morgan Kaufmann Publishers, 2005.
7. Douglas V Hall Microprocessors and Interfacing: Programming and Hardware, Tata McGraw – Hill, Second Edition, 2001.

COURSE RESULTS: Students understood about the recent trends of embedded systems and RTOS (its hardware's and software's). Experienced with programming concepts and embedded programming of C and C++.

Semester – VI / Core -Project

PROJECT WORK

**LTPC
0077**

The objective of the project work is to motivate the students for doing research survey and inculcate them to create a self-confidence to work independently. Each student should do an individual project and they can freely choose their own topic of experimental nature. The project should be of a systematic process within the specific duration.

Periodic seminars should be conducted to assess the students. The students should present the progress of the project to their respective guides and get the required assistance from them.

The student will submit their project report in the form of Dissertation which will be examined by the examiners.

The examination shall consist of

- I) evaluation of the dissertation and
- II) comprehensive viva- voce.

Students are encouraged to take the project work as a challenge so that their project will support their career.