SYLLABUS FOR B.SC (ELECTRONICS)

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)-Applied Mathematics, Allied Theory- III (for others)-Electronic Devices	3	3	75:25/3
22.	Allied Practical III (for Electronics)-Simulations of Applied Mathematics Allied Practical III (for others)-Electronic Devices Lab	3	1	50:50/3
23.	Skill Based Core-Consumer Electronic Appliances	4	4	75:25/3
24.	Non-Major Elective 1.ElectronicTroubleshooting (Select anyone) 2. Computer Hardware	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, Computer Networks	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)-Numerical methods Allied Theory - IV (for others)-Digital Circuits	3	3	75:25/3
32.	Allied Practical IV (for Electronics)- MATLAB simulation for numerical methods Allied Practical IV (for others)- Digital Circuits 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 1.Radio and Television (Select anyone) 2. Radar and Navigation	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, Medical Electronics	4	4	75:25/3
40.	Core Theory 9, IOT based applications	4	4	75:25/3
41.	Core Theory 10, Communication Systems	4	4	75:25/3

42.	Core Practical VII- Advanced Microprocessors Lab	3	1	50:50/3
43.	Core Theory Elective - I 1. Optical Display Applications (Select any one) 2. Mobile Communication	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, Power Electronics	4	4	75:25/3
47.	Core Theory 12, Semiconductor Fabrication Technology	4	4	75:25/3
48.	Core Theory 13, Robotics and Automation	4	4	75:25/3
49.	Core Theory 14, Computer Hardware and Maintenance	4	4	75:25/3
50.	Core Practical VIII-Power Electronics and System Design Lab	3	1	50:50/3
51.	Core Elective – II 1. Artificial Intelligence (Select any one) 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)

Semester – III / Core Theory –3

APPLIED ELECTRONICS

LTPC
4 4 0 4

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.KTheraja
8. Basic electrical Engg -P.SDhogalTMH

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

Semester – III / Core Theory –4

ELECTRONIC MEASUREMENTS AND CIRCUIT THEORY

LTPC
4004

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 andInstrumentation: McGrawHILL, 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&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.

Semester – III / Core Practical –3

ELECTRONIC CIRCUIT LAB - I

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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 andOscilloscope.
2. Resistors and capacitors in series andparallel
3. Verification of Ohm's Law
4. Measurement of Amplitude, Frequency & Phase difference usingOscilloscope.
5. Verification of Kirchoff'slaws.
6. Verification of Thevenin'stheorem
7. Verification of Norton's theorem.
8. Verification of SuperpositionTheorem.
9. Verification of ReciprocityTheorem.
10. Verification of Millman'stheorem.
11. Verification of Maximum Power TransferTheorem.
12. TransientResponse and analysis of RLC circuit
13. To plot frequency response of a seriesresonant 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 theorems

Semester – III / Core Practical –4

MEASUREMENTS LAB

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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

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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, $\chi 2$ -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)**

LIST OF TEXT BOOKS/ 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 DEVICES

LTPC

3003

OBJECTIVES:

- To acquire the knowledge about basic components of electronics and various other opto-electronic devices, amplifiers and oscillators.

UNIT I

BASIC COMPONENTS: Basic components used in Electronics -Resistor, capacitor, inductor and their different types - Diodes - Light Emitting diode (LED), Photo diode - Zener diode, LDR **(9L)**

UNIT II

POWER SUPPLIES: Need of a power supply - Types of power supplies - Different types of unregulated and regulated power supplies - IC Regulated power supply - switched mode power supply. **(9L)**

UNIT III

AMPLIFIERS: Transistor amplifier circuit - Types of Amplifiers - Single stage transistor amplifier - Feedback in amplifiers - Advantages of negative feedback amplifiers. **(9L)**

UNIT IV

OSCILLATORS: Oscillators Application, Classification, Sinusoidal Oscillator- Barhausen criteria - Hartley andColpitt's oscillators – Crystaloscillators **(9L)**

UNIT V

ELECTRICAL ELEMENTS: Electrical elements -Potential difference- Electric current- Electromotive force-Ohms law- Kirchoff's law- Kirchoff's current law- resistance in series circuits, parallel circuits and Concept of voltage source and current source **(9L)**

(Total:45L)

TEXT AND REFERENCE BOOKS:

1. Principles of Electronics - V.K. Mehta - S.Chand Publication, NewDelhi
2. Basic and Applied Electronics-T.K Bandyopadhyay, Books and Allied PvtLtd(2002)
3. Electronic devices and circuits - G.J.Mithal, Khana publishers, NewDelhi
4. Basic Electronics - B.L. Theraja - S.Chand publication, NewDelhi
5. Electronic devices and circuits - B.Sasikala, S.Poornachandra, Scitech publication India Pvt. Ltd.,Chennai.
6. Electronic devices and Application and integrated circuits - Mathur kulashethra& Chandra Umesh publication, NewDelhi.
7. Hand book of Electronics - Gupta & Kumar, Pragathiprakashan,Delhi.

COURSE RESULTS: Understand the basic concepts and operation of various electronic devices.

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 cancarry outbasic 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 DEVICES LAB

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OBJECTIVES:

- To practice with the basic semiconductor devices and their characteristics

1. PNjunction diodeCharacteristics
2. ZenerdiodeCharacteristics
3. DC regulated power supply using Zener diode
4. LED I-V characteristics
5. Transistor (Input and Output) Characteristics – Commonbase
6. Transistor (Input and Output) Characteristics – Commonemitter
7. Transistor (Input and Output) Characteristics – Commoncollector
8. Measurement of stability factor of self-biasingmethod
9. Measurement of stability factor of fixed biasingmethod
10. Field Effect Transistor (FET)Characteristics
11. Photodiode Characteristics
12. Phototransistor Characteristics
13. Photoconductivity of Light Dependent Resistor (LDR)
14. SCR Characteristics

COURSE RESULTS: Students had experience with the basic operations of various active electronic devices.

Semester – III / Skill based subject for major students, Core Theory-5

CONSUMER ELECTRONIC APPLIANCES

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OBJECTIVES:

- Provide the knowledge of consumer electronic appliances such as microwave ovens, washing machines, air conditioners, refrigerators, modern televisions and telecommunication devices.

UNIT I

MICROWAVE OVENS: Microwaves - Properties and generation Magnetrons, Waveguides-microwave oven block diagram - LCD timer with alarm – Single chip controllers – Types of microwave ovens- microwave Cooking-Features and parts of microwave oven-Wiring and safety instructions – Microwave cookware - Operating problem and solutions- Care and cleaning. **(12L)**

UNIT II

WASHING MACHINES: Electronic controller for washing machines - Washing machine hardware –Washing cycle- Hardware and software development - Types of washing machines - Fuzzy logic washing machines - Features of washing machines. **(10L)**

UNIT III

AIR CONDITIONERS AND REFRIGERATORS: Air Conditioning - Components of air conditioning systems - All water air conditioning systems - All air conditioning systems –Remote control buttons-Combination systems- Unitary and central air conditioning systems - Split air conditioners-Refrigeration- Refrigerants-Refrigeration Systems-Domestic Refrigerators .**(12L)**

UNIT IV

HOME / OFFICE DIGITAL DEVICES: Facsimile machine –Basic fax machine operations-Group 3 fax machines- Xerographic copier, Process-Extension to dynamic copier - Calculators - Structure of a calculator - Internal Organization of a calculators - Servicing electronic calculators - Digital clocks - Block diagram of a digital clock-LSI digital clock. **(12L)**

UNIT V

DIGITAL ACCESS SERVICES: Data services-Advantages of digital-Digital exchanges-The BORSCHT functions-Local distribution networks-Data services - Message switching - Message switching and circuit switching-Packet switching- Packet and message switching-Packet format-ISDN-The Internet- LAN - Functions and networks – MODEM - Barcode- Barcode Scanner and decoder -Bluetooth and Wireless enabled devices – Electronic Fund Transfer - Automated Teller Machines (ATMs) - Set-Top boxes - Digital cable TV **(14L)**

(Total: 60L)

COURSE RESULTS: It gives the knowledge about the electronic gadgets and consumer electronic appliances.

TEXT BOOK:

Consumer Electronics - S.P. Bali, Pearson Education, New Delhi, 2005.

Semester – III / Non-Major Elective (for other major) / Select (1) or (2)

1. ELECTRONICTROUBLESHOOTING

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OBJECTIVES:

- Troubleshoot various electronic devices (analog and digital) used in the industries

UNIT I

RELIABILITY OF ELECTRONIC EQUIPMENTS

Failures-Causes of Failures-Maintenance-Advantages of proper Maintenance, Maintenance Policy-Preventive Maintenance, Corrective Maintenance-Basic Procedure of Service and Maintenance **(6L)**

UNIT II

PREPARATIONS AND PRECAUTIONS

Troubleshooting Procedure-Fault Location-Fault Repair-Repair Verification-Perform Root cause Analysis-Fault Finding Aids-Service Manual-Test and Measurement Equipment-Multimeters-Cathode Ray Oscilloscope - Function Generators. **(6L)**

UNIT III

TROUBLESHOOTING TECHNIQUES

Functional Area Approach-Split Half Technique-Input to Output Technique-Output to input Technique-Divergent Paths Technique-Convergent paths Technique-Feedback Paths Technique-Switching Paths Technique, Measurement Techniques **(6L)**

UNIT IV

TESTING OF PASSIVE COMPONENTS

Resistors, Preset, L.D.R, Capacitors, Inductors, Transformers, Passive component testing using C.R.O-Testing Semiconductor Devices-Diode, Zener diode, L.E.D, Transistor, MOSFET, Thyristors, Testing of Active components using C.R.O.

(6L)

UNIT V

TROUBLE SHOOTING-DIGITAL INSTRUMENTS

Summary of Gates, Digital Logic Families-I.C packages, Digital Test Instruments-Logic Probe-Logic Pulser-Logic Clip-DigitalI.C Tester, Faults in Digital circuits, Precautions during Digital Troubleshooting-Troubleshooting-Power supply, SMPS,Oscilloscope. **(6L)**

(Total:30L)

TEXT BOOK:

Maintenance of Electronic Equipment's-K.Sudeep Singh - Kataria and Sons

COURSE RESULTS: Good knowledge received about the maintenance of electronic devices, measurements and its operation.

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

2. COMPUTERHARDWARE

L T P C

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OBJECTIVES:

- Theoretically students must understand about computer architecture, memory and design.

UNIT I

CPU: CPU essentials – processor modes – modern CPU concepts – Architectural performance features – the Intel's CPU **(6L)**

UNIT II

MEMORYCONCEPT: Essential memory concepts – memory organizations – memory packages –modules – logical memory organizations – memory considerations – memory types – memory techniques – selecting and installingmemory. **(6L)**

UNIT III

MOTHERBOARD: Active motherboards – sockets and slots – Intel D850GB – Pentium4 mother board – expansion slots – form factor – upgrading a mother board – chipsets –north bridge – south bridge **(6L)**

UNIT IV

POWER SUPPLY: Power supplies and power management – concepts of switching regulation – potential Power problems – power management. The floppy drive – magnetic storage – magnetic recording principles – data and disk organization – floppy drive – hard drive – data organization and hard drive – sector layout **(6L)**

UNIT V

DRIVES: IDE drive standard and features – Hard drive electronics – CDROM driveconstruction – CDROM electronics – DVD-ROM – DVD media – DVD drive and decoder.

(6L)

(Total:30L)

TEXT AND REFERENCE BOOKS:

1. Stephen J.Bigelow, ‒Trouble Shooting, maintaining and Repairing PCs‖, Tata McGraw-Hill, New Delhi, 2001.
2. Craig Zacker&JohnRourke, ‒Thecomplete reference: PC hardware,TataMcGraw-Hill, New Delhi,2001.
3. Mike Meyers, ‒Introduction to PC Hardware and Troubleshooting,Tata McGraw-Hill, New Delhi,2003.
4. B.Govindarajulu, ‒IBMPC and Cloneshardwaretrouble shootingand Maintenance‖, Tata McGraw-Hill, New Delhi,2002.

COURSE RESULTS: Students can understand very well about the computer motherboard architectures and peripherals.

Semester – III / Online initiative study -Core Theory -6

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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.

Semester – IV / Core -Theory-7 **LTPC**
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LINEAR INTEGRATED CIRCUITS

OBJECTIVES:

- Provide thebasic 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 op amp- 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-zerocrossing detectors- IC- 555 function block diagram-mono stable operation –astable operation – applications. **(12L)**

(Total:60L)

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.

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

Semester – IV / Core -Theory-8

COMPUTER NETWORKS

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OBJECTIVES:

- To understand the concept of data communication and networking models and to study the functions of OSI layered architecture and its protocols.
- To recognize the real time multimedia application in wired and wireless networks

UNITI

DATA COMMUNICATION CONCEPTS: Transmission media – Data encoding – Interface and Modems – Multiplexing – Error detection and correction – Digital subscriber line – Circuit switching – Packet switching – Message switching **(12L)**

UNITII

WIDE AREA NETWORKS:ISO – OSI layered architecture – Function of the layers – Data link protocols – HDLC, LAPB, LAPD, Inter networking devices – Repeaters, Bridges, Routers, Routing algorithms – Distance vector routing, link state routing,X.25protocol,congestioncontrol.

(12L)

UNITIII

FRAME RELAY AND ATM NETWORKS: Frame relay operation – layers and traffic control; ATM networks – Architecture switching, layers service classes.

(12L)

UNITIV

LOCAL AREA NETWORK:LAN topology – Ethernet – Token bus – Token ring – FDDI – Wireless LAN, ATM LAN – IEEE 802 Medium access control layer standard –Random access protocols – ALOHA – SlottedALOHA. **(12L)**

UNITV

OSI LAYERS: Transport layer issues – Session layer – Synchronization – Presentation layer – Encryption, decryption, Application layer – Message handling system, file transfer, virtual terminal – E- mail. **(12L)**

(Total:60L)

TEXT AND REFERENCE BOOKS:

1. William Stallings,Data and Computer Communication, 6th edition, Pearson Education Asia, 2000.
2. BehrouzA,Forouzan,Data Communication and Networking, second edition, Tata McGraw-Hill,2000.
3. FredHalsall, –Data Communication, Computer networksand Open Systems,Fourth edition, Addison Wesley,1995.
4. AndrewS.Tanenbaum, –Computer networks,Third edition, PHI, 1996,

COURSE RESULTS: Students can able to demonstrate the layered protocols and their functions of wired and wireless networks. They identify the networking devices and supporting software in computer networks.

Semester – IV / Core -Practical-5

LINEAR INTEGRATED CIRCUITS LAB

LTPC
0 0 31

OBJECTIVES:

- Provide the experimental knowledge of analog IC's, Amplifiers, filters, Operational Amplifier (OPAMP) characteristics, multivibrators and various OPAMP applications.

1. Inverting and Non-InvertingAmplifier.
2. Integrator andDifferentiator.
3. InstrumentationAmplifier.
4. High pass, Low pass filters.
5. Band passfilter.
6. Astable multivibrator usingOPAMP.
7. Monostable multivibrator usingOPAMP.
8. Phase shift oscillator usingOPAMP.
9. Wien Bridge oscillator usingOPAMP.
10. Digital to AnalogConverter.
11. Analog to DigitalConverter.
12. Astable Multivibrator usingIC555.
13. Monostable Multivibrator usingIC555.
14. Schmitt Trigger and Comparator usingOP-AMP.
15. Design of light switch using LDR andRelay.

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

Semester – IV / Core -Practical-6

ELECTRONIC CIRCUITS LAB - II

LTPC
0 0 31

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.

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

NUMERICAL METHODS

L T P C

OBJECTIVES: **3 0 0 3**

- Students will understand the numerical methods, equations andanalysis 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 $1/3^{rd}$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 OUTPUTS: Students can able to understand numerical methods, problems and their methods for the applications of various science and engineering solutions.

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

DIGITAL CIRCUITS

LTPC
3 0 0 3

OBJECTIVES:

- To equip the students with detailed knowledge of digital electronics, digital ICs in the CMOS series. They will learn number systems, logic gates, comparators, flip flops, registersand memories.

UNIT I

NUMBER SYSTEM: Basics and Number Systems-Digital signals – Basic Digital circuits – NAND, NOR, EX-OR – Universality of NAND and NOR – Number systems – Conversions. **(9L)**

UNIT II

LOGICAL CIRCUITS: Combinational Logic Design-Boolean Algebra – Demorgan's Theorem – Karnaugh Map – Don't care condition – Multiplexer – Demultiplexer. **(9L)**

UNIT III

FLIP FLOPS: Flipflops-Rs flipflop – JKFF – D FF – T FF – Master slave FF – Applications **(9L)**

UNIT IV

SHIFT REGISTERS: Shift Registers and counters-Registers – Left shift, Right shift, Parallel in parallel out Counters – Ripple counter, Decade counter – Modulo counters. **(9L)**

UNIT V

MEMORY: RAM – static, Dynamic – Diode ROM – PROM – EPROM – E2 PROM **(9L)**

(Total: 45L)

TEXT BOOKS:

1. Modern Digital electronics: R.P. Jain, TataMcGraw Hill1997
2. Digital Electronics, V.K. Puri, Tata Mc GrawHill
3. Computer System Architecture, 2nd Edition, M. Marris mano, PrenticeHall, 1998

COURSE RESULTS: Students will be equipped with binary arithmetic, logical expression, flip flops, shift registers, counters and memories.

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

MATLAB SIMULATION FOR NUMERICAL METHODS

	L	T	P	C
OBJECTIVES:	**0**	**0**	**2**	**1**

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

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

DIGITAL CIRCUITS LAB

LTPC
0 0 4 1

OBJECTIVES:

- To provide practical skills about digital electronics, digital ICs in the CMOS series. They will learn number systems, logic gates, comparators, flip flops and registers.

1. Study of AND, OR, NOT, NAND, NOR and XOR gates usingIC
2. Designing of all the logic gates using NAND gateIC
3. Designing of all the logic gates using NOR gateIC
4. Verification of Demorgan'stheorems
5. Construction of gates using discretecomponents
6. Codeconversion
7. Half adder and Fulladder
8. Half subtractor and Fullsubtractor
9. Multiplexer andDe-Multiplexer
10. Encoder and Decoder
11. Study of Flipflops
12. Shiftregister
13. Ripplecounter

COURSE RESULTS: Students will be practically well versed with binary arithmetic, logical expression, flip flops, shift registers and counters.

Semester – IV / Skill based subject, Core Theory - 9

MAINTENANCE AND TROUBLE SHOOTING OF AUDIO AND VIDEO EQUIPMENTS

LTPC
4 0 0 4

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)

TEXT AND REFERENCE BOOKS:

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.
3. Electronic Instruments and systems, Principles, Maintenance and Troubleshooting-R.G. Gupta Tata Mc Graw Hill Publishing Co.Ltd.
4. 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. RADIO ANDTELEVISION

LTPC
2 0 0 2

OBJECTIVES:

It gives knowledge aboutradio andtelevision that covers the basics of waves, wave propagation and working principles of Radio and television systems.

UNIT I

RADIO COMMUNICATIONS: Radio waves – Frequency & Wavelength – Modulation – Propagation of radio waves – Ground, Sky and Space waves – Fading – Radio Broadcast – Transmission and Reception. **(6L)**

UNIT II

RADIO TRANSMISSION: Classification of radio waves – Amplitude modulation – Frequency modulation – Radio transmitter – AM transmitter – Antennas (transmitting antenna), Basic ideas. **(6L)**

UNIT III

RADIO RECEPTION: Reception and detection of amplitude modulated waves – Function of a radio receiver – Characteristics of a receiver – Super heterodyne receiver – FM Broadcast receiver. **(6L)**

UNIT IV

TV TRANSMISSION: TV broadcasting system – scanning – Synchronization – Blanking – Video Signal – Television band and channels – Camera tubes – Image orthicon Vision.**(6L)**

UNIT V

TV RECEPTION: TV receiver – Tuner – Picture section – Receiver sweep section – Sound section power supply section – Color Mixing principles in color TV. **(6L)**

(Total: 30L)

TEXT AND REFERENCE BOOKS:

1. Basic Television and Video Systems, B.Grob, McGrawHill
2. Electronics and Radio Engineering, F.E. Terman, McGrawHill
3. Monochrome and Color Television, R.R. Gulari, Wiley EasternLtd.,

COURSE RESULTS: Students will be able to understand with radio and television transmission, reception and its wave propagation.

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

1. RADAR ANDNAVIGATION

LTPC

2 0 0 2

OBJECTIVES:

- To study about RADARs, Navigation and GPS. Learn the principles of transmitters, receivers, antennas and propagation related to radars.

UNIT I

BASIC RADAR: Basic Radar, The simple form of the Radar Equation Block schematic of pulse radar- Radar frequencies- Applications of radar, the origins of Radar **(6L)**

UNIT-II

CW RADAR: Applications of CW radar- CW radar with nonzero IF- FM CW radar-FM CW altimeter- MTI and Pulse Doppler radar. **(6L)**

UNIT-III

DOPPLER RADAR: Introduction to Doppler and MTI radar delay line Cancellers, digital MTI processing, Moving target detector, pulse Doppler radar. **(6L)**

UNIT IV

NAVIGATION: Direction finders- Instrument Landing System- Radio ranges. Navigation-Hyperbolic navigation- LORAN. Satellite navigation- Doppler navigation **(6L)**

UNIT-V

GPS: Global positioning system- Different types of microwave antennas-basic principles. Microwave passive devices, Coaxial connectors and adapters, Phase shifters, Attenuators, Waveguide Tees, Magic tees. **(6L)**

(Total:30L)

TEXT AND REFERENCE BOOKS:

1. Microwave Devices and circuits- Liao / PearsonEducation
2. Introduction to Radar systems-Merrill I Skolnik, 3rd Ed, TMH,2001.
3 Microwave Engineering – Annapurna Das, Sisir K Das TMH Publication,2001
4. Microwave Engineering – David M Pozar, John Wiley, 2e, 2004
5. Microwave devices and circuit: Samuel Liao,PHI.
6. Microwave and radar — A K Maini, KhannaPublishers.
7. Microwave and Radar Engg. — M Kulkarni.
8. Introduction to radar systems — Merrill I Skolnik, McGrawHill.
9. Radar systems and radio aids to navigation — A K Sen & A Bhattacharya.

COURSE RESULTS: Students will be able to illustrate the principles of navigation.Acquire the knowledge about range equation and the nature of detection. It recognizes the navigation systems using the satellite. Analyze the characteristics of navigation systems.

Semester – IV / Internship / Field Work

INTERNSHIP / FIELD WORK

L T P C

OBJECTIVES: **0032**

- To develop skills by visiting nearby industries / organizations.
- Acquire 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.

Semester – V / Core -Theory- 10

ADVANCED MICROPROCESSORS

LTPC
4 0 0 4

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 Hard ware, Douglas V.Hall,McGrawHill, New York(1988)
2. Microprocessor Architecture Programming and applications with 8085/ 8080A. S.RameshGoankar, Wiley EasternLimited(1986)
3. Digital systems & Microprocessor Douglas V.Hall, Mc GrawHill.
4. Microprocessor- Srinath, PHILtd.
5. 8051 Micro controller Architecture, Kennath J. Ayala, Programmingand Applications, Penram InternationalPublishing
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.

Semester – V / Core -Theory- 11

MEDICAL ELECTRONICS

LTPC
4 0 0 4

OBJECTIVES:

- To understand various bio-potentials, transducers, various systems and measuring instruments related to human body andworking principles of medical instruments.

UNIT I

TRANSDUCER AND ITS PRINCIPLES: Active transducers-passive transducers-transducers in bio medical applications-resting and action potentials-propagation of action potentials-bio electric potentials- bio potential electrodes.

(12L)

UNIT II

THE HEART AND CARDIO VASCULAR SYSTEM: Blood pressure-characteristics of blood flow-heart sounds-electro cardiograph - ECG Recorder Principles-measurement of blood pressure, blood flow and cardiac output- plethysmography- measurement of hearts sounds.

(12L)

UNIT III

PATIENT CARE AND MONITORING: The elements of intensive care monitoring-diagnosis calibration and reparability of patient monitoring equipment-pace makers-defibrillators.

(12L)

UNIT IV

PSYCHO PHYSIOLOGICAL MEASUREMENTS: Testing motor responses-sensory measurements –bio feedback instrumentation-bio telemetry introduction physiological parameters- bio telemetry components-application of telemetry. **(12L)**

UNIT V

IMAGING SYSTEM: X-ray machine-computer tomography (CT scanner) - Magnetic Resonance Imaging system- Ultra sonic imaging system. Colour Doppler. **(12L)**

(Total: 60L)

TEXT BOOKS:

1. Bio medical instrumentation and measurements – Leslie Cromwell, Fred J. Weibell and Erich A Pfeiffer-PHI, second edition-1996.
2. Hand book of Bio medical instrumentation- R.S.Khandpur, Tata McGraw Hill 1997.

COURSE RESULTS: The outcome of the students should have understood the concept of bio-potential; concepts of medical instrument its maintenance and develop the troubleshooting skills of medical instruments.

Semester – V / Core -Theory- 12

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 devicesand applications in IoT ecosystem, building blocks of IoT, Various technologiesmaking up IoT ecosystem, IoT levels, IoT design methodology, The PhysicalDesign/Logical Design of IoT, Functional blocks of IoT and CommunicationModels, 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 andactuators, microcontroller vs microprocessor, different type of microcontrollers inembedded 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 thedata 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)

AND REFERENCE BOOKS:

1. Macro Schwartz, “Internet of Things with Arduino- Cookbook”, Packt 2016.
2. ArshdeepBajga and Vijay Madisetti, “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.

Semester – V / Core -Theory- 13

COMMUNICATION SYSTEMS

LTPC
4 0 0 4

OBJECTIVES:

- To give a fundamental knowledge about communication systems, optical fiber transmission, cable transmission, telephone instruments, telephone switching and transmission, cellular phones and satellite communications.

UNIT-I

OPTICAL FIBER TRANSMISSION MEDIA: Optical Communication-Advantages of optical fibers-Block diagram of an Optical fiber communication system. Optical fiberconstruction, Light Propagation-Refraction, Refractive index, Snell's Law-Optical fiberconfigurations-Coupling Fibers-Fiber Splicing-Optical fiber connections-Coupling losses; Optical sources-LED's, ILD, Light Detectors-PIN Diodes.

(12L)

UNIT –II

TELEPHONE INSTRUMENT AND SIGNALS: Introduction-Carbon granule transmitter, receiving transducer, Simple local battery telephone circuit-Functions of Telephone set, Block diagram of Telephone set, Basic telephone call procedures, Call progress tones and signals-Dial tone, DTMF tone, Dial Pulse, Station busy, Equipment busy, Ringing, Ring-back, Receiver on/off hook, Cordless Telephones, Caller ID, Electronic telephones

(12L)

UNIT –III

PUBLIC TELEPHONE NETWORK AND SWITCHING: Instruments, Local Loops, Trunk Circuits and Exchanges, Local central office Telephone Exchanges, Operator assisted local exchanges, Automated central office switches and exchanges, Matrix switching, Step by stepswitching.

(12L)

UNIT-IV

CELLULAR TELEPHONE CONCEPT: Cellular Telephone-Fundamental concepts ofcellular Telephones: Frequency Reuse, Interference-Co-channel, Adjacent Channel, Cellsplitting, Sectoring, Segmentation and Duplication, Cellular system topology, Roaming,Handoff, Cellular Telephone Network Components-Electronic switching center, Cell sitecontroller, Radio Transceiver, System interconnects, Mobile and portable telephone units,Communication Protocols

(12L)

UNIT-V

SATELLITE COMMUNICATIONS: Keplers Laws, Satellite orbital pattern,Geosynchronous Satellites, Satellite classifications, Spacing and frequency allocation, Satellite antenna Radiation patterns, Footprints, Satellite system link models-Uplink, Transponder,Downlink, Cross-Links.

(12L)

(Total: 60L)

TEXT AND REFERENCE BOOKS:

1. Advanced Electronic Communication systems-Wayne Tomasi, PHI 6thEdition.
2. Telecommunication Systems-P.H Smale, Wheeler Publication 2ndEdition.
3. Optical Fiber Communications-Gerd Kaiser, Mc Graw-hill 2ndEdition.
4. Satellite Communications-Roddy, Mc Graw-hill 4thEdition.

COURSE RESULTS: Student will be well versed in communication and optical fiber communication systems. They understood about the operation of telephone exchange, parts of telephone, cellular phones transmission and satellite communications.

Semester – V / Core -Practical - 7

ADVANDED MICROPROCESSOR LAB

LTPC
0 0 4 2

OBJECTIVES:

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

A. MicroprocessorLab

1. Program for 8 Bit Addition and subtraction
2. Program for16 Bit Addition andsubtraction
3. Program for 8 Bit Multiplication anddivision
4. Program for 16Bit Multiplication andDivision
5. Program for Square and Square root of anumber
6. Program for Sorting and searching
7. Program for Smallest and Largest number in anarray.
8. Program for Reversing aString
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, A S C I I toBinary,
12. Binary to ASCI Conversion
13. Six letter worddisplay.
14. Rollingdisplay
15. Interfacing seven segment displays to display anycharacter.
16. Program to display Time(Hours andMinutes)
17. Program for 1’s complement and 2’s complement of 8 bit and 16-bitdata
18. Interfacing Traffic lightcontroller
19. Interfacing Stepper motorcontrol
20. Interfacing MatrixKeyboard
21. InterfacingA.D.C
22. InterfacingD.A.C
23. Study of 8255 chip and generationof
    1. Squarewave
    2. Triangularwave
    3. Saw Toothwave

3. Microcontroller 8051Lab

a. Addition – 8-bit, 16bit.
b. Subtraction – 8-bit, 16bit.
c. Multiplication 8bit
d. Division 8bit
e. Array addition(multibyte)
f. Logical Operations – AND, OR, NOT
g. Decimal to ASCII and ASCII toDecimal.
h. Decimal to Hexa and Hexa toDecimal.
i. AscendingOrder.
j. DescendingOrder
k. Up/downCounter
l. Block datatransfer
m. Interfacing withLCD.
n. Interfacing with MatrixKeypad.
o. Square wavegenerator
p. Interfacing withADC.
q. Interfacing withDAC.
r. DigitalClock.
s. 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 0 0 4

OBJECTIVES:

- Acquires the knowledgeof 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, Filed 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)

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

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

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

2. MOBILE COMMUNICATION

LTPC
4 0 0 4

OBJECTIVES:

- To educate thestudents basic knowledge about mobile communication, understand the cellular design concepts and wireless communication.To design a 3G and 4G wireless communication system to meet desired needs within realistic constraints.

UNIT I

INTRODUCTION: 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 a omni directional Antenna system, Cell splitting, consideration of the components of Cellular system.

(12L)

UNIT II

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

SIGNAL TRANSMISSION: 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 channel assignment, 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

MOBILE STANDARDS: 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

CELL CONCEPTS: 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, Tata McGraw Hill, 2006.
2. Gordon L. Stuber, "Principles of Mobile Communications", 2nd Edition, Springer International, 2007.
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. Understand the cellular design concepts and apply them in wireless communication. Design GSM and CDMA and its components in mobile and wireless communication. Design a 3G and 4G wireless communication systems to meet desired needs within realistic constraints.

Semester – V / Core -Mini project

MINI PROJECT

LTPC
0 0 53

OBJECTIVES:

1. To develop skills to formulate a technicalproject.
2. To give guidance on the various tasks of the project and standardprocedures.
3. To teach use of new tools, algorithms and techniques required to carry out theprojects.
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 theproject.

COURSE RESULTS:

1. Formulate a real-world problem, identify the requirement and develop the designsolutions.
2. Identify technical ideas, strategies andmethodologies.
3. Utilize the new tools, algorithms, techniques that contribute to obtain the solution of theproject.
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 oralpresentations

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.

Semester – VI / Core -Theory - 14

POWER ELECTRONICS

LTPC
4 0 0 4

OBJECTIVES:

- To provide a basic knowledge about power devices which gives basics of inverters, static switches: dc choppers and power supplies. This subject presents the principles and applications of industrial and power electronics.

UNIT I

POWER DEVICES: Need for semiconductor power devices, Power diodes, Enhancement of reverse blocking capacity, Introduction to family of thyristors. Silicon Controlled Rectifier (SCR): structure, I- V characteristics, Turn-On and Turn-Off characteristics, ratings, Factors affecting the characteristics/ratings of SCR, Gate-triggering circuits, Control circuits design and Protection circuits, Snubber circuit. **(12L)**

UNIT II

DIAC AND TRIAC: Basic structure, working and V-I characteristic of, application of a DIAC as a triggering device for a TRIAC. Insulated Gate Bipolar Transistors (IGBT): Basic structure, I-V Characteristics, switching characteristics, device limitations and safe operating area (SOA) etc. Power MOSFETs: operation modes, switching characteristics, power BJT, second breakdown, saturation and quasi-saturation state. **(12L)**

UNIT III

CHOPPERS: Basic chopper circuit, types of choppers step-down chopper, step-up chopper, operation of D.C. chopper circuits using self-commutation, cathode pulse turn-off chopper, load sensitive cathode pulse turn-off chopper (Jones Chopper), Morgan's chopper Application of SCR: SCR as a static switch, phase-controlled rectification, single phase half wave, full wave and bridge rectifiers with inductive & non-inductive loads; AC voltage control using SCR and TRAIC as a switch.

(12L)

UNIT IV

D.C MOTORS: Motor Principle-Comparison of motor and generator action. – AC motors – Induction motors – Speed control – Synchronous motors, relays and their characteristic and applications. **(12L)**

UNIT V

WELDING: Welding – Resistance welding – Seam welding –Heating, Induction heaters – High voltage DC transmission – Fan regulator using TRIAC. Electromechanical Machines: Principle of operation Thyristor based speed control of dc motors, AC motor.

(12L)

(Total:60L)

TEXT AND REFERENCE BOOKS:

1. Power Electronics, P.C. Sen,TMH
2. Power Electronics & Controls, S.K.Dutta
3. Power Electronics, M.D. Singh & K.B. Khanchandani,TMH
4. Power Electronics Circuits, Devices and Applications, 3rd Edition, M.H. Rashid, PearsonEducation
5. Power Electronics, Applications and Design, Ned Mohan,Tore.
6. Power Electronics, K. HariBabu, Scitech Publication.
7. Power Electronics, M.S. Jamil Asghar,PHI.
8. A Textbook of Electrical Technology, B.L. Thereja, A.K. Thereja,S.Chand
9. Industrial electronics – G.K. Mithal, Khanna Publications – Delhi – 15th Ed.1992.
10. Industrial and power electronics – C. Harish – Raj Umesh Publications – 4th Edn. 1992.
11. Basic electronics and linear circuits – N.N. Bhargava, D.C.Kulsheshtha and S.C.Gupta – Tata McGraw Hill -1987.

COURSE RESULTS: The students should have developed the circuit designing skills in power electronics. Understood about the concepts of industrial electronics systemdesign.

Semester – VI / Core -Theory - 15

SEMICONDUCTOR FABRICATION TECHNOLOGY

LTPC
4 0 0 4

OBJECTIVES:

- Understand the development of semiconductor fabrication technology to VLSI devices. Provide an exposure of VLSI design and their principles. To understand the concepts of MOSFETs and MOS based invertors.

UNIT I

INTRODUCTION: General classification of integrated circuits – Scale of integration – Advantages over discrete components. **(12L)**

UNIT II

THICK FILM TECHNOLOGY: Features of hybrid IC technology – Thick film conductors – Dielectric – Resistors – Thick film processing – Thick film substrate – Design ideas – Advantages and applications. **(12L)**

UNIT III

THIN FILM TECHNOLOGY: Thin film conductors – resistors – dielectric – substrates – thin film processing – Advantages and applications – Monolithic IC process: Growth and refining of Si crystals – Substrate slicing and polishing – Wafer preparation – Diffusion – Ion implantation – Oxidation – Photolithography – CVD – Epitaxial grown – Metallization – Monolithic resistors and capacitors. **(12L)**

UNIT IV

MODERN VLSI DEVICES: Introduction – Modern VLSI devices – High field effect – MOSFET devices – long channel & short channel MOSFET. **(12L)**

UNIT V

BIPOLAR DEVICES: Bipolar devices – n.p.n. transistor – characteristics of typical n.p.n. transistor – Bipolar device design – Design of emitter, base and collector region – concept of HDL. **(12L)**

(Total: 60L)

TEXT AND REFERENCE BOOKS:

1. Integrated Circuits (K.R. Botkar).
2. Fundamentals of Modern VLSI Devices by Yuan Taur and Tak H. NING, Cambridge Publishers.
3. Basic VLSI Design Systems and Circuits by Dougles A. Pucknell and Kamran Eshragian,PHI.
4. Device Electronics for Integrated Circuits – RichardMaller.
5. Integrated Electronics – Millman &Halkars.
6. VLSI Technology – S.M.Sze.

COURSE RESULTS: Students will be able to understand VLSI design methodologies and fabrication techniques. Concepts of MOSFETs and various MOS based devices are discussed. Realize and implement various Boolean functions using CMOS invertors.

Semester – VI / Core -Theory - 16

ROBOTICS AND AUTOMATION

LTPC

4 0 0 4

OBJECTIVES:

- To give a knowledge about robotics and its applications.
- To learn a program of robot and its industrial application.
- To learn about various drives, actuators and sensors.
- Study the role of CNC machines in automation.
- Learn about Programmable Logic Controllers (PLCs).

UNIT I

INTRODUCTION: Introduction Robotics and programmable automation, historical background, laws of robotics, robot definition, robot anatomy and systems, human systems and robotics. Specification of robotics. **(12L)**

UNIT II

ROBOT DRIVES: Actuators and control, Function of drive systems, general types of fluids, pump classification pneumatic system, Hydraulic system, Directional control valves, Process control valves, Rotary actuators electrical drives, DC: motors, stepper motor and drives mechanisms. **(12L)**

UNIT III

ROBOT END-EFFECTORS: Robot End-Effectors Classification of end-effectors, drive system for grippers, mechanical, magnetic, vacuum and adhesive grippers, hooks, scoops and others devices, active and passive Grippers. **(12L)**

UNIT IV

SENSORS AND INTELLIGENT ROBOTS: Sensors and Intelligent Robots Artificial intelligence and automated manufacturing, AI and robotics, need for sensing systems, sensory devices, types of sensors, robot vision systems- Robot Languages and programming Different languages, Computer numerical control- Features of CNC-CNC machine control unit CNC software **(12L)**

UNIT V

PROGRAMMABLE LOGIC CONTROLLERS (PLC): Discrete Process Control-Logic control, Sequencing-Ladder logic diagrams-Programmable logic controllers-Components of the PLC, PLC operating cycle-Additional capabilities of PLC, Programming the PLC-Personal computers using soft logic. Introduction to HMI, DCS and SCADA systems. **(12L)**

(Total: 60L)

TEXT AND REFERENCE BOOKS:

l. Robotics technology and flexible automation by S.R. DEB Tata Mc Graw Hill.

2. Mikell P.Groover, –Automation Production systems and Computer Integrated Manufacturing,Prentice-HallIndia,NewDelhi,1987.PearsonEducation,NewDelhi

3. W. Bolton, –Mechatronics‖, Pearson EducationAsia, 2002.

4. Introduction to robotics, mechanics and control by John J. Craig from Addison Wesley

5. Robotics principles and practice by Dr. K.C. Jain and Dr. L.N Agarwal from Khannapublishers

6. Introduction to robotics, mechanics and control by John J. Craig fromAddison Wesley;

7. Mikell P. Groover, –Industrial Robotics-Technology, ProgrammingandApplications,McGraw Hill, New Delhi,1986

8. K.S. Fu, R.C. Gonzalez and C S GLee,Robotics:Control, Sensing, Vision and Intelligence‖, McGraw Hill, New Delhi,1987.

COURSE RESULTS: The student should understand the basic concepts and the applications of robots in automation, CNC machines and PLC controllers.

Semester – VI / Core -Theory – 17

COMPUTER HARDWARE AND MAINTENANCE

LTPC
4 0 0 4

OBJECTIVES:

- To provide basic knowledge of PC architecture, motherboard and design and related peripherals.

UNIT I

COMPUTER HARDWARE OVERVIEW: Computer organization – PC hardware – Functional block of a PC – Buses – Bus concept – Bus cycle – Bus interface unit – Peripheral devices – Keyboard – CRT display – Monitor – Printer – Floppy disk drive – SMPS **(12L)**

UNIT II

MOTHER BOARD FUNCTIONS: Functional units and inter communication – Reset logic – CPU nucleus logic – DMA logic – Wait state logic – Bus arbitration logic – RAM logic – NMI logic – Speaker logic – Mode switch input logic – New generation mother board **(12L)**

UNIT III

FLOPPY DISK CONTROLLER: Floppy disk controller overview – Disk format – FDC system interface – FDD interface – Overall operation of floppy disk subsystem – New generation floppy disk controller Display adapter introduction – CRT display – 6845 CRT controller – CGA & AGA – Device interface **(12L)**

UNIT IV

HARD DISK CONTROLLER AND PRINTER: Overview of HDC organization – Disc drives types and interface – Hard disk card – Hard disk format Printer introduction: Centronics interface programming – Programming sequence– Hardware overview – Printer controller **(12L)**

UNIT V

TROUBLE SHOOTING: Types of faults – Hardware and software – Nature of faults – Solids and intermittent – Fault elimination process – Systematic troubleshooting – FDC & HDC problems – CRT monitor problems – Keyboard problems – SMPS problems. **(12L)**

(Total:60L)

TEXT BOOK:

1. GovindaRajulu B, ―PC IBM and Clones – Hardware, Troubleshooting and Maintenance, Tata McGraw Hill Publishing Company Ltd., New Delhi, 1991

COURSE RESULTS: Students will understand the components of the motherboard**,** can address issues related to CPU and memory. They will have good knowledge on Data storage devices and troubleshooting techniques.

Semester – VI / Core -Practical - 8

POWER ELECTRONICS AND SYSTEM DESIGN LAB

LTPC
0 0 31

OBJECTIVES:

- To provide practical skills about power electronic devices with the hands-ontraining with soldering for system design

A. Power Electronics

1. Characteristics ofSCR
2. Characteristics ofUJT
3. Characteristics ofDIAC
4. Characteristics ofTRIAC
5. Characteristics of powerMOSFET
6. Characteristics ofIGBT
7. R Triggering forThyristors
8. R C Triggering forThyristors
9. UJT Triggering forThyristors
10. Speed control of DCMotor
11. UJT RelaxationOscillator
12. AC PowerControl.

B. Electronics System Design

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

1. Soldering Practice
2. Design and construction of fixed voltage powersupply
3. Design and construction of Dual powersupply
4. Design and construction of switching powersupply
5. Design and construction of 1.5 to 12 V power supply using multi taptransformer.
6. Design and construction of Burglar alarm using LDR.
7. Design and construction of Temperature switch usingThermistor
8. Design and construction of Light sensitive switch using Photodiode
9. Design and construction of Audio amplifier using LM380
10. Design and construction of Timer circuit
11. Design and construction of Decade counter/ Seven segmentdecoder
12. Design and construction of Logicprobe

COURSE RESULTS: Students are well versed with power electronic devices and the hands-on training of soldering for system design

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

1. ARTIFICIAL INTELLIGENCE

LTPC

OBJECTIVES: **4 0 0 4**

- 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

INTELLEGENT 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 Bayeian 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

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

2. EMBEDDED SYSTEM AND RTOS

LTPC
4 0 0 4

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 forinternal programmable timing Devices – Interrupt servicing Mechanism – Context and the periods for context switching, Deadline and Interrupt Latency.

(12L)

UNIT IV

EMBEDDED SOFTWARE DELOPMENT 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.SriramV.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
0 0 7 7

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.