

CONTROLLED COPY



JAI SHRIRAM ENGINEERING COLLEGE, TIRUPPUR – 638 660

(An Autonomous Institution)

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai
Recognized by UGC & Accredited by NAAC and NBA (CSE and ECE)



REGULATIONS 2024

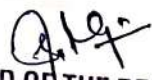
M.E. APPLIED ELECTRONICS

CHOICE BASED CREDIT SYSTEM

CURRICULUM FOR SEMESTERS I TO IV

&

SYLLABUS FOR SEMESTERS I & IV


HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashipalayam, Tirupur-638660.

HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashipalayam, Tirupur-638660.



JAI SHRIRAM ENGINEERING COLLEGE, TIRUPPUR – 638 660

(An Autonomous Institution)

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai
Recognized by UGC & Accredited by NAAC and NBA (CSE and ECE)



REGULATIONS 2024
M.E. APPLIED ELECTRONICS
CHOICE BASED CREDIT SYSTEM
CURRICULUM FOR SEMESTERS I TO IV

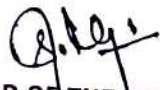
SEMESTER - I

| S. No. | COURSE CODE | COURSE TITLE | CATEGORY | L | T | P | C |
|-----------------------------|-------------|---|----------|-----------|----------|----------|-----------|
| THEORY | | | | | | | |
| 1. | 24PMA101 | Applied Mathematics for Electronics Engineers | FC | 3 | 1 | 0 | 4 |
| 2. | 24PRM101 | Research Methodology and IPR | RM | 2 | 0 | 0 | 2 |
| 3. | 24PEC101 | Advanced Digital Signal Processing | PC | 3 | 0 | 0 | 3 |
| 4. | 24PEC102 | Semiconductor Devices and Modeling | PC | 3 | 0 | 0 | 3 |
| 5. | 24PEC103 | Digital CMOS VLSI Design | PC | 3 | 0 | 0 | 3 |
| 6. | | Audit Course – I* | AC | 2 | 0 | 0 | 0 |
| THEORY CUM PRACTICAL | | | | | | | |
| 7. | 24PECI101 | Advanced Digital System Design | PC | 3 | 0 | 2 | 4 |
| PRACTICAL | | | | | | | |
| 8. | 24PEC111 | Electronics System Design Laboratory | PC | 0 | 0 | 3 | 1.5 |
| 9. | 24PEC112 | Signal Processing Laboratory | PC | 0 | 0 | 3 | 1.5 |
| Total Credits | | | | 19 | 1 | 8 | 22 |

*Audit course is optional

SEMESTER - II

| S. NO. | COURSE CODE | COURSE TITLE | CATEGORY | L | T | P | C |
|---------------|-------------|-----------------------------------|----------|---|---|---|---|
| THEORY | | | | | | | |
| 1. | 24PEC201 | Analog and Mixed Signal IC Design | PC | 3 | 0 | 0 | 3 |
| 2. | 24PEC202 | Industrial Internet of Things | PC | 3 | 0 | 0 | 3 |


HEAD OF THE DEPARTMENT
 Department of ECE
 Jai Shriram Engineering College
 Avinashpalayam, Tirupur-638660.

| | | | | | | | |
|-----------------------------|-----------|------------------------------------|----|-----------|----------|----------|-----------|
| 3. | 24PEC203 | Computer Vision & Machine Learning | PC | 3 | 0 | 0 | 3 |
| 4. | | Professional Elective I | PE | 3 | 0 | 0 | 3 |
| 5. | | Professional Elective II | PE | 3 | 0 | 0 | 3 |
| 6. | | Audit Course – II* | AC | 2 | 0 | 0 | 0 |
| THEORY CUM PRACTICAL | | | | | | | |
| 7. | 24PECI201 | Embedded Systems | PC | 3 | 0 | 2 | 4 |
| PRACTICAL | | | | | | | |
| 8. | 24PEC211 | VLSI Design Laboratory | PC | 0 | 0 | 4 | 2 |
| 9. | 24PEC212 | Mini Project with seminar | EE | 0 | 0 | 2 | 1 |
| Total Credits | | | | 20 | 0 | 8 | 22 |


SEMESTER - III

| S. NO. | COURSE CODE | COURSE TITLE | CATEGORY | L | T | P | C |
|----------------------|-------------|---------------------------|----------|-----------|----------|-----------|-----------|
| THEORY | | | | | | | |
| 1. | | Professional Elective III | PE | 3 | 0 | 0 | 3 |
| 2. | | Professional Elective IV | PE | 3 | 0 | 0 | 3 |
| 3. | | Professional Elective V | PE | 3 | 0 | 2 | 4 |
| 4. | | Open Elective | OE | 3 | 0 | 0 | 3 |
| 5. | 24PEC315 | Project Work I | EE | 0 | 0 | 12 | 6 |
| Total Credits | | | | 12 | 0 | 14 | 19 |

SEMESTER - IV


| S. NO. | COURSE CODE | COURSE TITLE | CATEGORY | L | T | P | C |
|----------------------|-------------|-----------------|----------|----------|----------|-----------|-----------|
| PRACTICAL | | | | | | | |
| 1. | 24PEC411 | Project Work II | EE | 0 | 0 | 24 | 12 |
| Total Credits | | | | 0 | 0 | 24 | 12 |

Total Credits:75


 HEAD OF THE DEPARTMENT
 Department of ECE
 Jai Shriram Engineering College
 Avinashipalayam, Tirupur-638660.

PROFESSIONAL ELECTIVES


| S.NO. | COURSE CODE | COURSE TITLE | CATEGORY | L | T | P | C |
|----------------------------------|-------------|--|----------|---|---|---|---|
| PROFESSIONAL ELECTIVE I | | | | | | | |
| 1. | 24PECP201 | Applications Specific Integrated Circuits | PE | 3 | 0 | 0 | 3 |
| 2. | 24PECP202 | Computer Architecture and Parallel Processing | PE | 3 | 0 | 0 | 3 |
| 3. | 24PECP203 | Automotive Electronics | PE | 3 | 0 | 0 | 3 |
| 4. | 24PECP204 | Robotics | PE | 3 | 0 | 0 | 3 |
| 5. | 24PECP205 | Soft Computing and Optimization Techniques | PE | 3 | 0 | 0 | 3 |
| PROFESSIONAL ELECTIVE II | | | | | | | |
| 1. | 24PECP206 | RF System Design | PE | 3 | 0 | 0 | 3 |
| 2. | 24PECP207 | Electromagnetic Interference and Compatibility | PE | 3 | 0 | 0 | 3 |
| 3. | 24PECP208 | VLSI Design Techniques | PE | 3 | 0 | 0 | 3 |
| 4. | 24PECP209 | Nano Technologies | PE | 3 | 0 | 0 | 3 |
| 5. | 24PECP210 | VLSI Testing | PE | 3 | 0 | 0 | 3 |
| 6. | 24PECP211 | Edge Analytics and Internet of Things | PE | 3 | 0 | 0 | 3 |
| PROFESSIONAL ELECTIVE III | | | | | | | |
| 1. | 24PECP301 | Quantum Computing | PE | 3 | 0 | 0 | 3 |
| 2. | 24PECP302 | VLSI for Wireless Communication | PE | 3 | 0 | 0 | 3 |
| 3. | 24PECP303 | Micro Electro Mechanical Systems | PE | 3 | 0 | 0 | 3 |
| 4. | 24PECP304 | Hardware Secure Computing | PE | 3 | 0 | 0 | 3 |
| 5. | 24PECP305 | CAD for VLSI Design | PE | 3 | 0 | 0 | 3 |
| PROFESSIONAL ELECTIVE IV | | | | | | | |
| 1. | 24PECP306 | Sensors and Actuators | PE | 3 | 0 | 0 | 3 |
| 2. | 24PECP307 | Signal Integrity for High Speed Design | PE | 3 | 0 | 0 | 3 |


HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashipalayam, Tirupur-638660.

| | | | | | | | |
|--------------------------------|-----------|---|----|---|---|---|---|
| 3. | 24PECP308 | Consumer Electronics | PE | 3 | 0 | 0 | 3 |
| 4. | 24PECP309 | Advanced Microprocessors and Microcontrollers Architectures | PE | 3 | 0 | 0 | 3 |
| 5. | 24PECP310 | Biomedical Signal Processing | PE | 3 | 0 | 0 | 3 |
| PROFESSIONAL ELECTIVE V | | | | | | | |
| 1. | 24PECP311 | Modeling and Synthesis with HDL | PE | 3 | 0 | 2 | 4 |
| 2. | 24PECP312 | Deep Learning | PE | 3 | 0 | 2 | 4 |
| 3. | 24PECP313 | Advanced Digital Image Processing | PE | 3 | 0 | 2 | 4 |
| 4. | 24PECP314 | PCB Design& Fabrication | PE | 3 | 0 | 2 | 4 |

LIST OF OPEN ELECTIVES FOR PG PROGRAMMES

| S. No. | COURSE CODE | COURSE TITLE | CATEGORY | L | T | P | C |
|--------|-------------|--|----------|---|---|---|---|
| 1. | 24PCEO01 | Environmental Sustainability | OE | 3 | 0 | 0 | 3 |
| 2. | 24PCEO02 | Vibration and Noise Control Strategies | OE | 3 | 0 | 0 | 3 |
| 3. | 24PCEO03 | Integrated Water Resources Management | OE | 3 | 0 | 0 | 3 |
| 4. | 24PCEO04 | Environmental Impact Assessment | OE | 3 | 0 | 0 | 3 |
| 5. | 24PECO01 | IoT for Smart Systems | OE | 3 | 0 | 0 | 3 |
| 6. | 24PCSO02 | Internet of Things and Cloud | OE | 3 | 0 | 0 | 3 |
| 7. | 24PCSO03 | Machine Learning and Deep Learning | OE | 3 | 0 | 0 | 3 |
| 8. | 24PEEO01 | Electric Vehicle Technology | OE | 3 | 0 | 0 | 3 |
| 9. | 24PEEO02 | Renewable Energy Technology | OE | 3 | 0 | 0 | 3 |
| 10. | 24PECO01 | Biomedical Signal Processing | OE | 3 | 0 | 0 | 3 |
| 11. | 24PECO02 | Robotics | OE | 3 | 0 | 0 | 3 |
| 12. | 24PMBO01 | Sustainable Management | OE | 3 | 0 | 0 | 3 |


 HEAD OF THE DEPARTMENT
 Department of ECE
 Jai Shriram Engineering College
 Avinashpalayam, Tirupur-638660.

| | | | | | | | |
|-----|----------|-------------------------------------|----|---|---|---|---|
| 13. | 24PMBO02 | Micro and Small Business Management | OE | 3 | 0 | 0 | 3 |
| 14. | 24PMEO01 | Nanocomposite Materials | OE | 3 | 0 | 0 | 3 |
| 15. | 24PMEO02 | Additive Manufacturing | OE | 3 | 0 | 0 | 3 |

AUDIT COURSES (AC)


Registration for any of these courses is optional to students

| S. NO. | COURSE CODE | COURSE TITLE | PERIODS PER WEEK | | | CREDITS |
|--------|-------------|------------------------------------|------------------|---|---|---------|
| | | | L | T | P | |
| 1. | 24PAC001 | English for Research Paper Writing | 2 | 0 | 0 | 0 |
| 2. | 24PAC002 | Disaster Management | 2 | 0 | 0 | 0 |
| 3. | 24PAC003 | Constitution of India | 2 | 0 | 0 | 0 |
| 4. | 24PAC004 | நற்றமிழ் இலக்கியம் | 2 | 0 | 0 | 0 |

CREDITS SUMMARY

| S. NO. | Course Components | Credits per Semester | | | | Total Credits |
|----------------------|-------------------|----------------------|-----------|-----------|-----------|---------------|
| | | I | II | III | IV | |
| 1. | FC | 04 | | | | 04 |
| 2. | PC | 16 | 15 | | | 31 |
| 3. | PE | | 06 | 10 | | 16 |
| 4. | RM | 02 | | | | 02 |
| 5. | OE | | | 03 | | 03 |
| 6. | EE | | 01 | 06 | 12 | 19 |
| 7. | AC | √ | √ | | | |
| Total Credits | | 22 | 22 | 19 | 12 | 75 |

Total Credits for the entire Programme: 75


HEAD OF THE DEPARTMENT
 Department of ECE
 Jai Shriram Engineering College
 Avinashipalayam, Tirupur-638660.

CONTROLLED COPY



JAI SHRIRAM ENGINEERING COLLEGE, TIRUPPUR – 638 660

(An Autonomous Institution)

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai
Recognized by UGC & Accredited by NAAC and NBA (CSE and ECE)



REGULATIONS 2024

M.E. APPLIED ELECTRONICS

CHOICE BASED CREDIT SYSTEM

SYLLABUS FOR SEMESTER I

A. K. S.
2/12/24

HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashipalayam, Tirupur-638660.

| | | | | | |
|----------|---|---|---|---|---|
| 24PMA101 | APPLIED MATHEMATICS FOR ELECTRONICS ENGINEERS | L | T | P | C |
| | | 3 | 1 | 0 | 4 |

COURSE OBJECTIVES:

- To introduce the fundamentals of fuzzy logic.
- To understand the basics of random variables with emphasis on the standard discrete and continuous distributions.
- To understand the basic probability concepts with respect to two dimensional random variables.
- To make students understand the notion of a Markov chain, and how simple ideas of conditional probability and matrices can be used to give a thorough and effective account of discrete – time Markov chains.
- To provide the required fundamental concepts in queueing models and apply these techniques in networks, image processing.

| | | |
|---|--------------------|-----------|
| UNIT-I | FUZZY LOGIC | 12 |
| Classical logic – Multivalued logics – Fuzzy propositions – Fuzzy qualifiers. | | |


| | | |
|--|---|-----------|
| UNIT-II | PROBABILITY AND RANDOM VARIABLES | 12 |
| Probability – Axioms of probability – Conditional probability – Bayes theorem – Random variables – Probability function – Moments – Moment generating functions and their properties – Binomial, Poisson, Geometric, Uniform, Exponential, Gamma and Normal distributions – Function of a random variable. | | |

| | | |
|--|---|-----------|
| UNIT-III | TWO DIMENSIONAL RANDOM VARIABLES | 12 |
| Joint distributions – Marginal and conditional distributions – Functions of two dimensional random variables – Regression curve – Correlation. | | |

| | | |
|---|-------------------------|-----------|
| UNIT-IV | RANDOM PROCESSES | 12 |
| Classification – Stationary random process – Markov process – Markov chain – Poisson process – Gaussian process – Auto correlation – Cross correlation. | | |

| | | |
|---|------------------------|-----------|
| UNIT-V | QUEUEING MODELS | 12 |
| Poisson process – Markovian queues – Single and multi server models – Little's formula – Machine Interference model – Steady state analysis – Self service queue. | | |

| | | | |
|-------------|-------------|-------------|---------------------------|
| L:60 | T: 0 | P: 0 | Total : 60 Periods |
|-------------|-------------|-------------|---------------------------|


HEAD OF THE DEPARTMENT
 Dept. of Science & Humanities,
 Jay Shriram Engineering College
 Dharapuram Road, Avinashpalayam,
 TIRUPUR -638 600, Tamilnadu.

REFERENCES

1. Ganesh M., "Introduction to Fuzzy Sets and Systems, Theory and Applications", Academic Press, New York, 1997.
2. George J. Klir and Yuan B., "Fuzzy sets and Fuzzy logic" Prentice Hall, New Delhi, 2006.
3. Devore J.L., "Probability and Statistics for Engineering and Sciences", Cengage learning, 9th Edition, Boston, 2017.
4. Johnson R.A. and Gupta, C.B., "Miller and Friends Probability and Statistics for Engineers", Pearson India Education, Asia, 9th Edition, New Delhi, 2017.
6. Oliver C. Ibe," Fundamentals of applied probability and Random process", Academic press, Boston, 2014.
7. Gross D. and Harris C.M., "Fundamentals of Queuing theory", Willey student, 3rd Edition, New Jersey, 2004.

COURSE OUTCOMES

At the end of the course students should be able to


CO1: Apply the concepts of fuzzy sets, fuzzy logic, fuzzy prepositions and fuzzy quantifiers and in relate.

CO2: Analyze the performance in terms of probabilities and distributions achieved by the determined solutions.

CO3: Use some of the commonly encountered two dimensional random variables and extend to multivariate analysis.

CO4: Classify various random processes and solve problems involving stochastic processes.

CO5: Use queueing models to solve practical problems.


HEAD OF THE DEPARTMENT
Dept. of Science & Humanities
Jay Shriram Engineering College
Dharapuram Road, Avinashipattinam,
TIRUPUR -638 660, Tamilnadu.

| | | | | | |
|----------|---|---|---|---|---|
| 24PRM101 | RESEARCH METHODOLOGY AND IPR (Common to M.E-AE, M.E - CSE, M.E - SE) | L | T | P | C |
| | | 2 | 0 | 0 | 2 |

COURSE OBJECTIVES:

- To design and implement various research methodologies
- To Apply appropriate data collection methods and design effective measurement tools.
- To Analyze complex data using multivariate techniques, test hypotheses, and present research findings clearly through written reports and oral presentations.
- To Understand and apply key concepts, processes, and international frameworks related to Intellectual Property Rights.
- To Understand the patent process, including the stages of application, examination, and grant, and demonstrate knowledge of fundamental patenting principles.

| | | |
|---|------------------------|----------|
| UNIT-I | RESEARCH DESIGN | 6 |
| Overview of research process and design, Use of Secondary and exploratory data to answer the research question, Qualitative research, Observation studies, Experiments and Surveys. | | |

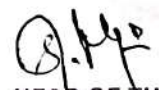
| | | |
|--|------------------------------------|----------|
| UNIT-II | DATA COLLECTION AND SOURCES | 6 |
| Measurements, Measurement Scales, Questionnaires and Instruments, Sampling and methods. Data - Preparing, Exploring, examining and displaying. | | |

| | | |
|--|------------------------------------|----------|
| UNIT-III | DATA ANALYSIS AND REPORTING | 6 |
| Overview of Multivariate analysis, Hypotheses testing and Measures of Association. Presenting Insights and findings using written reports and oral presentation. | | |

| | | |
|---|-------------------------------------|----------|
| UNIT-IV | INTELLECTUAL PROPERTY RIGHTS | 6 |
| Intellectual Property – The concept of IPR, Evolution and development of concept of IPR, IPR development process, Trade secrets, utility Models, IPR & Bio diversity, Role of WIPO and WTO in IPR establishments, Right of Property, Common rules of IPR practices, Types and Features of IPR Agreement, Trademark, Functions of UNESCO in IPR maintenance. | | |

| | | |
|--|----------------|----------|
| UNIT-V | PATENTS | 6 |
| Patents – objectives and benefits of patent, Concept, features of patent, Inventive step, Specification, Types of patent application, process E-filing, Examination of patent, Grant of patent, Revocation, Equitable Assignments, Licences, Licensing of related patents, patent agents, Registration of patent agents. | | |

| | | | |
|-------------|------------|------------|----------------------|
| L:30 | T:0 | P:0 | T: 30 PERIODS |
|-------------|------------|------------|----------------------|


 HEAD OF THE DEPARTMENT
 Department of ECE
 Jai Shriram Engineering College
 Avinashpalayam, Tirupur-638660.

TEXT BOOKS

1. Cooper Donald R, Schindler Pamela S and Sharma JK, "Business Research Methods", Tata McGraw Hill Education, 11e (2012).
2. Catherine J. Holland, "Intellectual property: Patents, Trademarks, Copyrights, Trade Secrets", Entrepreneur Press, 2007.
3. David Hunt, Long Nguyen, Matthew Rodgers, "Patent searching: tools & techniques", Wiley, 2007.
4. The Institute of Company Secretaries of India, Statutory body under an Act of parliament, "Professional Programme Intellectual Property Rights, Law and practice", September 2013

REFERENCES

1. David Hunt, Long Nguyen, Matthew Rodgers, "Patent searching: tools & techniques", Wiley, 2007. 12
2. The Institute of Company Secretaries of India, Statutory body under an Act of parliament, "Professional Programme Intellectual Property Rights, Law and practice", September 2013.

COURSE OUTCOMES

At the end of the course students should be able to


.CO1: Demonstrate the ability to design and implement various research methodologies to Address specific research questions.

CO2: Apply appropriate data collection methods, design effective measurement tools

CO3: Analyze complex data using multivariate techniques, test hypotheses, and present Research findings clearly through written reports and oral presentations.

CO4: Understand the key concepts, processes, and international frameworks of Intellectual Property Rights, and demonstrate knowledge.

CO5: Understand the patent process, including application, examination, and grant, and demonstrate knowledge of patenting principles.


HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashipalayam, Tirupur-638660.

| | | | | | |
|----------|------------------------------------|---|---|---|---|
| 24PEC101 | ADVANCED DIGITAL SIGNAL PROCESSING | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

| |
|---|
| COURSE OBJECTIVES: |
| <ul style="list-style-type: none"> To describe fundamental concepts of DSP and Discrete Transforms To design digital filters design To estimate power spectrum using non- parametric and parametric methods To analyze the Multirate Signal processing by decimation and interpolation. To apply the concept of multirate signal processing for various applications |

| | | |
|--|----------------------------------|----------|
| UNIT-I | DIGITAL SIGNAL PROCESSING | 9 |
| Sampling of analog signals - Selection of sampling frequency - Frequency response - Transfer functions - Filter structures - Fast Fourier Transform (FFT) Algorithms - Image coding - DCT. | | |


| | | |
|---|------------------------------|----------|
| UNIT-II | DIGITAL FILTER DESIGN | 9 |
| IIR and FIR Filters: Filter structures, Implementation of Digital Filters - 2nd Order Narrow Band Filter and 1st Order All Pass Filter, Frequency sampling structures of FIR, Lattice structures, Forward and Backward prediction error filters, Reflection coefficients for lattice realization, Implementation of lattice structures for IIR filters, Advantages of lattice structures. | | |

| | | |
|--|-------------------------------------|----------|
| UNIT-III | ESTIMATION OF POWER SPECTRUM | 9 |
| Non-Parametric Methods: Estimation of spectra from finite duration observation of signals, : Bartlett, Welch & Blackman-Tukey methods, Performance Comparison. Parametric Methods: Autocorrelation & Its Properties, Relation between auto correlation & model parameters, AR Models - Yule-Walker & Burg Methods. | | |

| | | |
|--|-------------------------------------|----------|
| UNIT-IV | MULTI RATE SIGNAL PROCESSING | 9 |
| Decimation by a factor D - Interpolation by a factor I - Sampling rate conversion by a rational factor I/D, Multistage Implementation of Sampling Rate Conversion, Filter design and Implementation for sampling rate conversion. Up-sampling using All Pass Filter. | | |

| | | |
|--|---|----------|
| UNIT-V | APPLICATIONS OF MULTI RATE SIGNAL PROCESSING AND DSP INTEGRATED CIRCUITS | 9 |
| Design of Phase Shifters, Interfacing of Digital Systems with Different Sampling Rates, Implementation of Narrow Band Low Pass Filters, Implementation of Digital Filter Banks, Subband Coding of Speech Signals, Quadrature Mirror Filters, Over Sampling A/D and D/A Conversion. | | |

| | | | |
|------|-----|-----|---------------|
| L:45 | T:0 | P:0 | T: 45 PERIODS |
|------|-----|-----|---------------|


HEAD OF THE DEPARTMENT
 Department of ECE
 Jai Shriram Engineering College
 Avinashpalayam, Tirupur-638660.

TEXT BOOKS

1. J.G.Proakis & D. G.Manolakis Digital Signal Processing: Principles, Algorithms & Applications - 4th Ed., Pearson Education, 2013.
2. Alan V Oppenheim & Ronald W Schaffer Discrete Time signal processing, Pearson Education, 2014.
3. Keshab K. Parhi, 'VLSI Digital Signal Processing Systems Design and Implementation', John Wiley& Sons, 2007.

REFERENCES

1. Steven. M .Kay, Modern Spectral Estimation: Theory & Application –PHI, 2009.
2. P.P.Vaidyanathan, Multi Rate Systems and Filter Banks , Pearson Education, 1993.
4. Emmanuel C. Ifeachor, Barrie W. Jervis, "Digital Signal Processing–A practical approach", Second Edition, Harlow, Prentice Hall, 2011. N.Weste, K. Eshraghian, Principles Of Cmos VLSI Design", Addison Wesley, 2nd Edition, 1993

COURSE OUTCOMES

At the end of the course students should be able to

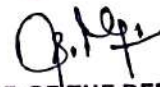
CO1: Describe the basics of Digital Signal Processing and Discrete Time Transforms.

CO2: Describe the basics of Digital Filter Processing and Discrete Time Transforms.

CO3: Estimate power spectrum using appropriate parametric/non-parametric method.

CO4: Analyze discrete time system at different sampling frequencies using the concept of Multirate signal processing.

CO5: Design discrete time system for the given application using Multi rate signal processing.



HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashpalayam, Tirupur-638660.



Faint red stamp or text at the bottom left corner, possibly a department or college stamp.

| | | | | | |
|----------|------------------------------------|---|---|---|---|
| 24PEC102 | SEMICONDUCTOR DEVICES AND MODELING | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

COURSE OBJECTIVES:


- To acquire the fundamental knowledge and to expose to the field of semiconductor theory and devices and their applications.
- To gain adequate understanding of semiconductor device modelling aspects, designing devices for electronic applications
- To acquire the fundamental knowledge of different semiconductor device modelling aspects.

| | | |
|---|-----------------------|----------|
| UNIT-I | MOS CAPACITORS | 9 |
| Surface Potential: Accumulation, Depletion, and Inversion, Electrostatic Potential and Charge Distribution in Silicon, Capacitances in an MOS Structure, Polysilicon-Gate Work Function and Depletion Effects, MOS under Nonequilibrium and Gated Diodes, Charge in Silicon Dioxide and at the Silicon–Oxide Interface, Effect of Interface Traps and Oxide Charge on Device Characteristics, High-Field Effects, Impact Ionization and Avalanche Breakdown, Band-to-Band Tunneling, Tunneling into and through Silicon Dioxide, Injection of Hot Carriers from Silicon into Silicon Dioxide, High-Field Effects in Gated Diodes, Dielectric Breakdown. | | |

| | | |
|--|-----------------------|----------|
| UNIT-II | MOSFET DEVICES | 9 |
| Long-Channel MOSFETs, Drain-Current Model, MOSFET I–V Characteristics, Subthreshold Characteristics, Substrate Bias and Temperature Dependence of Threshold Voltage, MOSFET Channel Mobility, MOSFET Capacitances and Inversion-Layer Capacitance Effect, Short-Channel MOSFETs, Short-Channel Effect, Velocity Saturation and High-Field Transport Channel Length Modulation, Source–Drain Series Resistance, MOSFET Degradation and Breakdown at High Fields | | |

| | | |
|---|---------------------------|----------|
| UNIT-III | CMOS DEVICE DESIGN | 9 |
| CMOS Scaling, Constant-Field Scaling, Generalized Scaling, Nonscaling Effects, Threshold Voltage, Threshold-Voltage Requirement, Channel Profile Design, Nonuniform Doping, Quantum Effect on Threshold Voltage, Discrete Dopant Effects on Threshold Voltage, MOSFET Channel Length, Various Definitions of Channel Length, Extraction of the Effective Channel Length, 16 Physical Meaning of Effective Channel Length, Extraction of Channel Length by C–V Measurements. | | |

| | | |
|--|------------------------|----------|
| UNIT-IV | BIPOLAR DEVICES | 9 |
| n–p–n Transistors, Basic Operation of a Bipolar Transistor, Modifying the Simple Diode Theory for Describing Bipolar Transistors, Ideal Current–Voltage Characteristics, Collector Current, Base Current, Current Gains, Ideal IC–VCE Characteristics, Characteristics of a Typical n–p–n Transistor, Effect of Emitter and Base Series Resistances, Effect of Base–Collector Voltage on Collector Current, Collector Current Falloff at High Currents, Nonideal | | |


HEAD OF THE DEPARTMENT
 Department of ECE
Jai Shriram Engineering College
 Avinashipalayam, Tirupur-638660.

Base Current at Low Currents, Bipolar Device Models for Circuit and Time-Dependent Analyses Basic dc Model, Basic ac Model, Small-Signal Equivalent-Circuit Model, Emitter Diffusion Capacitance, Charge-Control Analysis, Breakdown Voltages, Common-Base Current Gain in the Presence of Base-Collector Junction Avalanche, Saturation Currents in a Transistor.

| | | |
|---------------|---|----------|
| UNIT-V | MATHEMATICAL TECHNIQUES FOR DEVICE SIMULATIONS | 9 |
|---------------|---|----------|

Poisson equation, continuity equation, drift-diffusion equation, Schrodinger equation, hydrodynamic equations, trap rate, finite difference solutions to these equations in 1D and 2D space, grid generation.

| | | | |
|-------------|------------|------------|----------------------|
| L:45 | T:0 | P:0 | T: 45 PERIODS |
|-------------|------------|------------|----------------------|

TEXT BOOKS

1. Yuan Taur and Tak H.Ning, "Fundamentals of Modern VLSI Devices", Cambridge University Press, 2016.
2. A.B. Bhattacharyya "Compact MOSFET Models for VLSI Design", John Wiley & Sons Ltd, 2009.
3. Ansgar Jungel, "Transport Equations for Semiconductors", Springer, 2009 .

REFERENCES

1. Trond Ytterdal, Yuhua Cheng and Tor A. Fjeldly Wayne Wolf, "Device Modeling for Analog and RF CMOS Circuit Design", John Wiley & Sons Ltd, 2004
2. Selberherr, S., "Analysis and Simulation of Semiconductor Devices", Springer-Verlag., 1984
3. Behzad Razavi, "Fundamentals of Microelectronics" Wiley Student Edition, 2nd Edition, 2014
4. J P Collinge, C A Collinge, "Physics of Semiconductor devices" Springer, 2002.
5. S.M.Sze, Kwok.K. NG, "Physics of Semiconductor devices", Springer, 2006. CO-PO Mapping CO POs PO1 PO2 PO3 PORattan, S.S, "Theory of Machines", 3rd Edition, Tata McGraw-Hill, New Delhi, 2009(Unit I, II, III,IV & V)
6. Ambekar A. G, "Mechanism and Machine Theory", 3rd Edition, Prentice Hall of India, New Delhi, 2007(Unit III, IV, V)

COURSE OUTCOMES

At the end of the course students should be able to

CO1: Explore the properties of MOS capacitors.

CO2: Analyze the various characteristics of MOSFET devices.

CO3: Describe the various CMOS design parameters and their impact on performance of the device

CO4: Discuss the device level characteristics of BJT transistors.

CO5: Identify the suitable mathematical technique for simulation.


HEAD OF THE DEPARTMENT
 Department of ECE
Jai Shriram Engineering College
 Avinashipalayam Tirupur-620560.

| | | | | | |
|----------|--------------------------|---|---|---|---|
| 24PEC103 | DIGITAL CMOS VLSI DESIGN | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

COURSE OBJECTIVES:

- To introduce the transistor level design of all digital building blocks common to all cmos microprocessors, network processors, digital backend of all wireless systems etc.
- To introduce the principles and design methodology in terms of the dominant circuit choices, constraints and performance measures
- To learn all important issues related to size, speed and power consumption

| | | |
|---|---|----------|
| UNIT-I | MOS TRANSISTOR PRINCIPLES AND CMOS INVERTE | 9 |
| MOSFET characteristic under static and dynamic conditions, MOSFET secondary effects, elmore constant, CMOS inverter-static characteristic, dynamic characteristic, power, energy, and energy delay parameters, stick diagram and layout diagrams. | | |

| | | |
|---|-------------------------------------|----------|
| UNIT-II | COMBINATIONAL LOGIC CIRCUITS | 9 |
| Static CMOS design, different styles of logic circuits, logical effort of complex gates, static and dynamic properties of complex gates, interconnect delay, dynamic logic gates. | | |

| | | |
|--|----------------------------------|----------|
| UNIT-III | SEQUENTIAL LOGIC CIRCUITS | 9 |
| Static latches and registers, dynamic latches and registers, timing issues, pipelines, clocking strategies, nonbistable sequential circuits. | | |

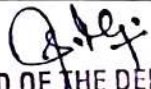
| | | |
|--|-----------------------------------|----------|
| UNIT-IV | ARITHMETIC BUILDING BLOCKS | 9 |
| Data path circuits, architectures for adders, accumulators, multipliers, barrel shifters, speed, power and area tradeoffs. | | |

| | | |
|--|-----------------------------|----------|
| UNIT-V | MEMORY ARCHITECTURES | 9 |
| Memory architectures and Memory control circuits: Read-Only Memories, ROM cells, Read Write Memories (RAM), dynamic memory design, 6 Transistor SRAM cell, sense amplifiers. | | |

| | | | |
|-------------|------------|------------|----------------------|
| L:45 | T:0 | P:0 | T: 45 PERIODS |
|-------------|------------|------------|----------------------|

TEXT BOOKS

1. N.Weste, K. Eshraghian, " Principles Of Cmos VLSI Design", Addison Wesley, 2nd Edition, 1993
2. M J Smith, "Application Specific Integrated Circuits", Addison Wesley, 1997


HEAD OF THE DEPARTMENT
 Department of ECE
 Jai Shriram Engineering College
 Avinashipalayam, Tirupur-638660.

REFERENCES

1. Sung-Mo Kang & Yusuf Leblebici, "CMOS Digital Integrated Circuits Analysis And Design", Mcgraw-Hill, 1998
2. Jan Rabaey, Anantha Chandrakasan, B Nikolic, " Digital Integrated Circuits: A Design Perspective", Prentice Hall Of India, 2nd Edition, Feb 2003

COURSE OUTCOMES

At the end of the course students should be able to

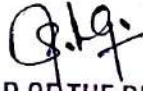
CO1: Use mathematical methods and circuit analysis models in analysis of CMOS digital circuits.

CO2: Create models of moderately sized static CMOS combinational circuits that realize specified digital functions and to optimize combinational circuit delay using RC delay models and logical effort.

CO3: Design sequential logic at the transistor level and compare the trade offs of sequencing elements including flip-flops, transparent latches.

CO4: Understand design methodology of arithmetic building blocks.

CO5: Design functional units including ROM and SRAM


HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashpalayam, Tirupur-638660.

| | | | | | |
|-----------|--------------------------------|---|---|---|---|
| 24PEC1101 | ADVANCED DIGITAL SYSTEM DESIGN | L | T | P | C |
| | | 3 | 0 | 2 | 4 |

COURSE OBJECTIVES:

- To design asynchronous sequential circuits.
- To learn about hazards in asynchronous sequential circuits.
- To study the fault testing procedure for digital circuits.
- To understand the architecture of programmable devices.
- To design and implement digital circuits using programming tools

| | | |
|---|--------------------------------|----------|
| UNIT-I | SEQUENTIALCIRCUITDESIGN | 9 |
| Analysis of Clocked Synchronous Sequential Circuits and Modelling- State Diagram, State Table, State Table Assignment and Reduction-Design of Synchronous Sequential Circuits Design of Iterative Circuits-ASM Chart and Realization using ASM. | | |


| | | |
|---|--|----------|
| UNIT-II | ASYNCHRONOUS SEQUENTIAL CIRCUITDESIGN | 9 |
| Analysis of Asynchronous Sequential Circuit – Flow Table Reduction-Races-State Assignment- Transition Table and Problems in Transition Table- Design of Asynchronous Sequential Circuit - Static, Dynamic and Essential hazards–Mixed Operating Mode Asynchronous Circuits– Designing Vending Machine Controller. | | |

| | | |
|---|---|----------|
| UNIT-III | FAULT DIAGNOSIS AND TESTABILITY ALGORITHMS | 9 |
| Fault Table Method-Path Sensitization Method – Boolean Difference Method -D Algorithm – Tolerance Techniques – The Compact Algorithm – Fault in PLA – Test Generation - DFT Schemes – Built in Self Test. | | |

| | | |
|---|--|----------|
| UNIT-IV | SYNCHRONOUS DESIGN USING PROGRAMMABLE DEVICES | 9 |
| Programming Logic Device Families – Designing a Synchronous Sequential Circuit using PLA/PAL – Designing ROM with PLA – Realization of Finite State Machine using PLD – FPGA – Xilinx FPGA - Xilinx 4000. | | |

| | | |
|--|---------------------------------|----------|
| UNIT-V | SYSTEMDESIGNUSINGVERILOG | 9 |
| Hardware Modelling with Verilog HDL – Logic System, Data Types And Operators For Modelling In Verilog HDL - Behavioural Descriptions In Verilog HDL – HDL Based Synthesis – Synthesis Of Finite State Machines– Structural Modelling – Compilation And Simulation Of Verilog Code – Test Bench - Realization Of Combinational And Sequential Circuits Using Verilog – Registers – Counters – Sequential Machine – Serial Adder – Multiplier- Divider – Design Of Simple Microprocessor, Introduction To System Verilog | | |

| | | | |
|------|-----|------|---------------|
| L:45 | T:0 | P:30 | T: 75 PERIODS |
|------|-----|------|---------------|


HEAD OF THE DEPARTMENT
 Department of ECE
 Jai Shriram Engineering College
 Avinashpalayam, Tirupur-638660.

PRACTICAL LIST:**30**

1. Design of Registers by Verilog HDL.
2. Design of Counters by Verilog HDL.
3. Design of Sequential Machines by Verilog HDL.
4. Design of Serial Adders , Multiplier and Divider by Verilog HDL.
5. Design of a simple Microprocessor by Verilog HDL.

REFERENCES

1. Charles H.Roth jr., "Fundamentals of Logic Design" Thomson Learning,2013.
2. M.D.Ciletti , Modeling, Synthesis and Rapid Prototyping with the Verilog HDL, Prentice Hall, 1999
3. M.G.Arnold, Verilog Digital – Computer Design, Prentice Hall (PTR), 1999.
4. Nripendra N Biswas "Logic Design Theory" Prentice Hall of India,2001.
5. Paragk.Lala "Fault Tolcrant and Fault Testable Hardware Design" B S Publications,2002
6. Paragk.Lala "Digital System Design Using PLD" B S Publications,2003.
7. Palnitkar , Verilog HDL – A Guide to Digital Design and Synthesis, Pearson , 2003.

COURSE OUTCOMES

At the end of the course students should be able to


CO1: Analyse and design synchronous sequential circuits.

CO2: Analyse hazards and design asynchronous sequential circuits.

CO3: Knowledge on the testing procedure for combinational circuit and PLA.

CO4: Able to design PLD and ROM.

CO5: Design and use programming tools for implementing digital circuits of industry standards


HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashpalayam, Tirupur-638660.

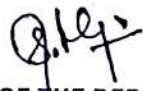
| | | | | | |
|----------|--------------------------------------|---|---|---|-----|
| 24PEC111 | ELECTRONICS SYSTEM DESIGN LABORATORY | L | T | P | C |
| | | 0 | 0 | 3 | 1.5 |

COURSE OBJECTIVES:

- Design of instrumentation amplifier and voltage regulator
- Design of PCB layout
- Write a Verilog HDL coding of various combinational circuits
- Verify the design functionality for various memory modules
- Design of PLL circuits

LIST OF EXPERIMENTS

1. Design of a 4-20 mA transmitter for a bridge type transducer.
Design the Instrumentation amplifier with the bridge type transducer (Thermistor or any resistance variation transducers) and convert the amplified voltage from the instrumentation amplifier to 4 – 20 mA current using op-amp. Plot the variation of the temperature Vs output current.
2. Design of AC/DC voltage regulator using SCR
3. Design a phase controlled voltage regulator using full wave rectifier and SCR, vary the conduction angle and plot the output voltage.
4. PCB layout design using CAD Drawing the schematic of simple electronic circuit and design of PCB layout using CAD
5. HDL based design entry and simulation of Parameterizable cores of Counters, Shift registers, State machines, 8-bit Parallel adders and 8 –Bit multipliers.
6. HDL based design entry and simulation of Parameterizable cores on the simple Distributed Arithmetic system. Test vector generation and timing analysis.
7. HDL based design entry and simulation of Parameterizable cores on memory design and 4 – bit ALU. Synthesis, P&R and post P&R simulation, Critical paths and static timing analysis results to be identified. FPGA real time programming and I/O interfacing.
8. Interfacing with Memory modules in FPGA Boards. Verifying design functionality by probing internal signals.
9. Realization of Discrete Fourier transform/Fast Fourier Transform algorithm in HDL and observing the spectrum in simulation.
10. Invoke PLL module and demonstrate the use of the PLL for clock generation in FPGAs. Verify design functionality implemented in FPGA by capturing the signal in Oscilloscope


 HEAD OF THE DEPARTMENT
 Department of ECE
 Jai Shriram Engineering College
 Avinashpalayam, Tirupur-638660.

| | | | | | |
|----------|------------------------------|---|---|---|-----|
| 24PEC112 | SIGNAL PROCESSING LABORATORY | L | T | P | C |
| | | 0 | 0 | 3 | 1.5 |

COURSE OBJECTIVES:

- To provide the student with the basic understanding of audio signal analysis using filters
- To provide the students with the understanding of the working of statistical method based approaches
- To impart the students with the design of filters
- To demonstrate the working of algorithms for different applications
- To provide knowledge of analyzing the images and video


LIST OF EXPERIMENTS

1. Design of Adaptive channel equalizer
2. Realization of sub band filter using linear convolution
3. Realization of STFT using FFT
4. Demonstration of Bayes technique
5. Demonstration of Min-max technique
6. Realization of FIR Wiener filter
7. Generation of Multivariate Gaussian generated data with desired mean vector and the required co-variance matrix.
8. Design and Realization of the adaptive filter using LMS algorithm (solved using steepest- descent algorithm)
9. Representation of the 2D image signal as the linear combinations of PCA (Eigen faces)
10. Image compression using Discrete cosine transformation (DCT).
11. Multiple-input Multiple output (MIMO)
12. Speech recognition using Support Vector Machine (SVM)
13. LMS filtering implementation using TMS320C6x processor
14. Face detection and tracking in video using OpenCV

LIST OF EQUIPMENTS REQUIRED

1. Systems
2. MATLAB/SCILAB software
3. Anaconda Python software/ Equivalent open source simulator tool
4. DSP processor and interfacing tool

| | | | |
|-----|-----|------|---------------|
| L:0 | T:0 | P:45 | T: 45 PERIODS |
|-----|-----|------|---------------|


HEAD OF THE DEPARTMENT
 Department of ECE
 Jai Shriram Engineering College
 Avinashipalayam, Tirupur-638660.

LIST OF EQUIPMENTS REQUIRED

1. SCR
2. Ammeter – (0 to 10 mA)
3. Op Amp
4. Diode
5. PCB design software
6. FPGA simulator tool
7. FPGA Trainer Board
8. Xilinx Vivado Design Suite 2014.2 Software or Equivalent
9. Regulated Power Supply (0-30V)
10. Spectrum Analyzer Frequency: 1.5 GHz
11. Digital Storage Oscilloscope
12. Function Generator
13. PCs

| | | | |
|-----|-----|------|---------------|
| L:0 | T:0 | P:45 | T: 45 PERIODS |
|-----|-----|------|---------------|

REFERENCES

1. Neil H.E. Weste, David Harris, Ayan Banerjee, "CMOS VLSI Design- A circuits and Systems Perspective", Third Edition, 2013, Pearson education.
2. M. Morris Mano, Michael D. Ciletti, "Digital Design with an introduction to Verilog HDL", PHI, 6th Edition, 2018
3. James E. Palmer, David E. Perlman, "Schuams Outlines-Introduction to Digital Systems", Tata McGraw Hill, 2nd Edition 2003
4. Sergio Franco, "Design with operational amplifiers and analog integrated circuits", 3rd Edition, Tata McGraw Hill, 2007
5. D.Roy Choudhry, Shail Jain, "Linear Integrated Circuits", New Age International Private Limited, 4th Edition, 2010

COURSE OUTCOMES

At the end of the course students should be able to


CO1: Design an instrumentation amplifier and voltage regulator.

CO2: Design a PCB layout using CAD tool.

CO3: Write a Verilog code for various combinational and sequential circuits.

CO4: Develop a memory module with FPGA.

CO5: Design an PLL circuit.


HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashpalayam, Tirupur-638660.

REFERENCES

1. Vinay K.Ingle,John G.Proakis, Digital signal processing using MATLAB, Cengage Learning, 3rd edition, 2011
2. Michael R King, Nipa Mody, Numerical and statistical methods for Bio Engineering – Applications using MATLAB, CAMBRIDGE University Press, 2010
3. V. Siahaan, R.H.Sianipar, Signal and Image processing with python GUI, Balige Publishing,2021

COURSE OUTCOMES

At the end of the course students should be able to

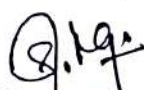
CO1: Obtain the ability to apply knowledge of linear algebra, random process and multirate signal processing in various signal processing applications.

CO2: Develop the student's ability on conducting engineering experiments, analyze experimental observations scientifically.

CO3: Become familiar to fundamental principles of linear algebra.

CO4: Familiarize the basic operations of filter banks through simulations.

CO5: Apply the principles of random process in practical applications


HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashipalayam, Tirupur-638660.

CONTROLLED COPY



JAI SHRIRAM ENGINEERING COLLEGE, TIRUPPUR – 638 660

(An Autonomous Institution)

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

Recognized by UGC & Accredited by NAAC and NBA (CSE and ECE)




REGULATIONS 2024

M.E. APPLIED ELECTRONICS

CHOICE BASED CREDIT SYSTEM

SYLLABUS FOR SEMESTER II


HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashipalayam, Tirupur-638660.

| | | | | | |
|----------|-----------------------------------|---|---|---|---|
| 24PEC201 | ANALOG AND MIXED SIGNAL IC DESIGN | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

COURSE OBJECTIVES:

- To study the concepts of MOS large signal model and small signal model
- To provide in-depth understanding of the analog integrated circuit and building blocks
- To learn the Analog and Digital layout design for mixed signal circuits
- To Understand the methodologies for analysis and design of fundamental CMOS Analog and Mixed signal Circuits like Data Converters and filters.
- To study the integrated circuits like oscillators and PLLs.

| | | |
|---------------|---|----------|
| UNIT-I | INTRODUCTION AND BASIC MOS DEVICES | 9 |
|---------------|---|----------|

Challenges in analog design-Mixed signal layout issues- MOS FET structures and characteristics- large signal model – small signal model- single stage Amplifier-Source follower- Common gate stage – Cascode Stage

| | | |
|----------------|---------------------------------|----------|
| UNIT-II | SUBMICRON CIRCUIT DESIGN | 9 |
|----------------|---------------------------------|----------|

Submicron CMOS process flow, Capacitors and resistors, Current mirrors, The MOSFET Switch, Analog Circuit Design: Biasing, Op-Amp Design, Circuit Noise - OP Amp parameters

| | | |
|-----------------|------------------------|----------|
| UNIT-III | DATA CONVERTERS | 9 |
|-----------------|------------------------|----------|

Characteristics of Sample and Hold- Digital to Analog Converters- architecture-Differential Non linearity-Integral Non linearity- Voltage Scaling-Cyclic DAC-Pipeline DAC-Analog to Digital Converters- architecture – Flash ADC-Pipeline ADC-Differential Non linearity-Integral Non linearity. Overview of SNR of Data Converters- Clock Jitters- Improving Using Averaging – Decimating Filters for ADC- Band pass and High Pass Sinc Filters- Interpolating Filters for DAC

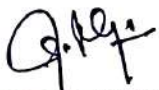
| | | |
|----------------|--|----------|
| UNIT-IV | ANALOG AND DIGITAL LAYOUT DESIGN FOR MIXED SIGNAL | 9 |
|----------------|--|----------|

Layout introduction: Introduction, MOS transistor layers, stick diagram, symbolic diagram. Digital layout design: Introduction, guide line of transistor layout, PMOS and NMOS transistor layout, CMOS transistor layout. Introduction to analog layout techniques and Passive component layout - capacitor, resistor and inductor, Floor planning of analog and digital components, power supply and ground pin issues, matching, shielding, interconnection issues.

| | | |
|---------------|----------------------------|----------|
| UNIT-V | OSCILLATORS AND PLL | 9 |
|---------------|----------------------------|----------|

LC oscillators, Voltage Controlled Oscillators. Simple PLL, Charge pumps PLLs, Non ideal effects in PLLs, Delay Locked Loops. Applications of PLL. frequency multiplication and synthesis. Introduction to RF IC Design, building blocks, applications.

| | | | |
|------|-----|-----|---------------|
| L:45 | T:0 | P:0 | T: 45 PERIODS |
|------|-----|-----|---------------|


HEAD OF THE DEPARTMENT
 Department of ECE
 Jai Shriram Engineering College
 Avinashpalayam, Tirupur-638660.

REFERENCES

1. P. Allen and D. Holberg, "CMOS Analog Circuit Design", Oxford University Press, Second Edition, 2012.
2. B. Razavi, "Design of Analog CMOS Integrated Circuits", McGraw Hill, 2003.
3. R. Jacob Baker, H.W. Li, and D.E. Boyce CMOS Circuit Design, Layout and Simulation, Prentice-Hall of India, 1998.
4. Paul R. Gray, Paul J. Hurst, Stephen H. Lewis, Robert G. Meyer, "Analysis and Design of Analog Integrated Circuits", Wiley Publishers, Fifth Edition, 2009.

COURSE OUTCOMES

At the end of the course students should be able to


CO1: Carry out research and development in the area of analog and mixed signal IC design.

CO2: Well versed with the MOS fundamentals, small signal models and analysis of MOSFET based circuits.

CO3: Analyze and model data converters architecture.

CO4: Understand and Design different mixed signal circuits for various applications as per the user specifications.

CO5: Analyze and design mixed signal circuits such as Comparator, ADCs, DACs, PLL.


HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashipalayam, Tirupur-638660.

| | | | | | |
|----------|-------------------------------|---|---|---|---|
| 24PEC202 | INDUSTRIAL INTERNET OF THINGS | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

COURSE OBJECTIVES:

- To understand the fundamentals of Internet of Things
- To learn about the basics of IOT protocols
- To build a small low cost embedded system using IoT
- To apply the concept of IOT in the real world scenario

| | | |
|--|---|----------|
| UNIT-I | INTRODUCTION AND ARCHITECTURE OF IoT | 9 |
| Introduction – Definition and characteristics of IoT – Physical and Logical Design of IoT - Communication models and APIs – Challenges in IoT - Evolution of IoT- Components of IoT - A Simplified IoT Architecture – Core IoT Functional Stack. | | |

| | | |
|--|-----------------------|----------|
| UNIT-II | INDUSTRIAL IoT | 9 |
| IIoT-Introduction, Industrial IoT: Business Model and Reference Architecture: IIoT-Business Models, Industrial IoT- Layers: IIoT Sensing, IIoT Processing, IIoT Communication, IIoT Networking | | |

| | | |
|---|-----------------------|----------|
| UNIT-III | IIOT ANALYTICS | 9 |
| Big Data Analytics and Software Defined Networks, Machine Learning and Data Science, Julia Programming, Data Management with Hadoop | | |


| | | |
|--|---------------------|----------|
| UNIT-IV | IOT SECURITY | 9 |
| Industrial IoT: Security and Fog Computing - Cloud Computing in IIoT, Fog Computing in IIoT, Security in IIoT. | | |

| | | |
|---|-------------------|----------|
| UNIT-V | CASE STUDY | 9 |
| Industrial IOT- Application Domains: Oil, chemical and pharmaceutical industry, Applications of UAVs in Industries, Real case studies: Milk Processing and Packaging Industries, Manufacturing Industries | | |

| | | | |
|-------------|------------|------------|----------------------|
| L:45 | T:0 | P:0 | T: 45 PERIODS |
|-------------|------------|------------|----------------------|

REFERENCES

1. Industry 4.0: The Industrial Internet of Things”, by Alasdair Gilchrist (Apress), 2017
2. “Industrial Internet of Things: Cyber manufacturing Systems” by Sabina Jeschke, Christian Brecher, Houbing Song, Danda B. Rawat (Springer), 2017
3. Hands-On Industrial Internet of Things: Create a powerful Industrial IoT by Giacomo Veneri, Antonio Capasso, Packt, 2018.


 HEAD OF THE DEPARTMENT
 Department of ECE
 Jai Shriram Engineering College
 Avinashipalayam, Tirupur-638660.

COURSE OUTCOMES

At the end of the course students should be able to


CO1: Understand the basic concepts and Architectures of Internet of Things.

CO2: Understand various IoT Layers and their relative importance.

CO3: Realize the importance of Data Analytics in IoT.

CO4: Study various IoT platforms and Security.

CO5: Understand the concepts of Design Thinking.



HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashipalayam, Tirupur-638660.

| | | | | | |
|----------|--------------------------------------|---|---|---|---|
| 24PEC203 | COMPUTER VISION AND MACHINE LEARNING | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

COURSE OBJECTIVES:

- To review image processing techniques for computer vision.
- To understand shape and region analysis.
- To understand Hough Transform and its applications to detect lines, circles, ellipses.
- To introduce students to the basic concepts and techniques of Machine Learning
- To understand Linear & graphical models of machine learning algorithms

| | | |
|--|-------------------------------------|----------|
| UNIT-I | IMAGE PROCESSING FOUNDATIONS | 9 |
| Review of image processing techniques – classical filtering operations – thresholding techniques – edge detection techniques – corner and interest point detection – mathematical morphology – texture | | |

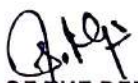
| | | |
|---|---------------------------|----------|
| UNIT-II | SHAPES AND REGIONS | 9 |
| Binary shape analysis – connectedness – object labeling and counting – size filtering – distance functions – skeletons and thinning – deformable shape analysis – boundary tracking procedures – active contours – shape models and shape recognition – centroidal profiles – handling occlusion – boundary length measures – boundary descriptors – chain codes – Fourier descriptors – region descriptors – moments | | |

| | | |
|--|------------------------|----------|
| UNIT-III | HOUGH TRANSFORM | 9 |
| Line detection – Hough Transform (HT) for line detection – foot-of-normal method – line localization – line fitting – RANSAC for straight line detection – HT based circular object detection – accurate center location – speed problem – ellipse detection – Case study: Human Iris location – hole detection – generalized Hough Transform (GHT) – spatial matched filtering – GHT for ellipse detection – object location – GHT for feature collation. | | |

| | | |
|---|---|----------|
| UNIT-IV | INTRODUCTION MACHINE LEARNING TECHNIQUES | 9 |
| Learning – Types of Machine Learning – Supervised Learning – The Brain and the Neuron – Design a Learning System – Perspectives and Issues in Machine Learning – Concept Learning Task – Concept Learning as Search – Finding a Maximally Specific Hypothesis – Version Spaces and the Candidate Elimination Algorithm – Linear Discriminants – Perceptron – Linear Separability – Linear Regression. | | |

| | | |
|--|---|----------|
| UNIT-V | LINEAR MODELS & GRAPHICAL MODELS | 9 |
| Multi-layer Perceptron – Going Forwards – Going Backwards: Back Propagation Error – Multi layer Perceptron in Practice – Examples of using the MLP – Overview – Deriving Back Propagation – Radial Basis Functions and Splines – Concepts – RBF Network – Curse of Dimensionality – Interpolations and Basis Functions – Support Vector Machines. Markov Chain Monte Carlo Methods – Sampling – Proposal Distribution – Markov Chain Monte Carlo – Graphical Models – Bayesian Networks – Markov Random Fields – Hidden Markov Models – Tracking Methods | | |

| | | | |
|------|-----|-----|---------------|
| L:45 | T:0 | P:0 | T: 45 PERIODS |
|------|-----|-----|---------------|


 HEAD OF THE DEPARTMENT
 Department of ECE
 Jai Shriram Engineering College
 Avinashipalayam, Tirupur-638660.

REFERENCES

1. D. L. Baggio et al., —Mastering OpenCV with Practical Computer Vision Projects, Packt Publishing, 2012.
2. E. R. Davies, —Computer & Machine Vision, Fourth Edition, Academic Press, 2012.
3. Jan Erik Solem, —Programming Computer Vision with Python: Tools and algorithms for analyzing images, O'Reilly Media, 2012.
4. Ethem Alpaydin, —Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series), Third Edition, MIT Press, 2014.
5. Jason Bell, —Machine learning – Hands on for Developers and Technical Professionals, First Edition, Wiley, 2014.
6. Tom M Mitchell, —Machine Learning, First Edition, McGraw Hill Education, 2013

COURSE OUTCOMES


At the end of the course students should be able to

CO1 : Implement fundamental image processing techniques required for computer vision & Perform shape analysis

CO2 : Implement boundary tracking techniques

CO3 : Apply the appropriate machine learning strategy for any given problem

CO4 : Design systems that uses the appropriate graph models of machine learning


HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashipalayam, Tirupur-638660.

| | | | | | |
|-----------|------------------|---|---|---|---|
| 24PECI201 | EMBEDDED SYSTEMS | L | T | P | C |
| | | 3 | 0 | 2 | 4 |

COURSE OBJECTIVES:

- Learn Embedded design challenges and design methodologies
- Study general and single purpose processor
- Understand bus structures
- Design a state machine and concurrent process models
- Know about Embedded software development tools and RTOS.

| | | |
|--|---------------------------------|----------|
| UNIT-I | EMBEDDED SYSTEM OVERVIEW | 9 |
| Embedded System Overview, Design Challenges – Optimizing Design Metrics, Design Methodology, RT-Level Combinational and Sequential Components, Optimizing Custom Single- Purpose Processors. | | |

| | | |
|--|---|----------|
| UNIT-II | GENERAL AND SINGLE PURPOSE PROCESSOR | 9 |
| Basic Architecture, Pipelining, Superscalar and VLIW architectures, Programmer's view, Development Environment, Application-Specific Instruction-Set Processors (ASIPs) Microcontrollers, Timers, Counters and watchdog Timer, UART, LCD Controllers and Analog-to- Digital Converters, Memory Concepts. | | |

| | | |
|---|-----------------------|----------|
| UNIT-III | BUS STRUCTURES | 9 |
| Basic Protocol Concepts, Microprocessor Interfacing – I/O Addressing, Port and Bus-Based I/O, Arbitration, Serial Protocols, I2C, CAN and USB, Parallel Protocols – PCI and ARM Bus, Wireless Protocols – IrDA, Bluetooth, IEEE 802.11. | | |

| | | |
|--|--|----------|
| UNIT-IV | STATE MACHINE AND CONCURRENT PROCESS MODELS | 9 |
| Basic State Machine Model, Finite-State Machine with Datapath Model, Capturing State Machine in Sequential Programming Language, Program-State Machine Model, Concurrent Process Model, Communication among Processes, Synchronization among processes, Dataflow Model, Real-time Systems, Automation: Synthesis, Verification: Hardware/Software Co-Simulation, Reuse: Intellectual Property Cores, Design Process Models | | |

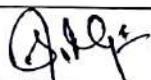
| | | |
|---|---|----------|
| UNIT-V | EMBEDDED SOFTWARE DEVELOPMENT TOOLS AND RTOS | 9 |
| Compilation Process – Libraries – Porting kernels – C extensions for embedded systems – emulation and debugging techniques – RTOS – System design using RTOS. | | |

PRACTICAL LIST:

30

Exercise – 1

Comparative study of software development tools and design steps with respect to FPGA based and Non – FPGA based (defined logic) embedded system development.


 HEAD OF THE DEPARTMENT
 Department of ECE
 Jai Shriram Engineering College
 Avinashpalayam, Tirupur-638660.

(For Example: consider any Spartan FPGA board for FPGA based Embedded System Consider any cortex- M based board for Non – FPGA based Embedded system)

Exercise – 2

Implement adder and decoder logic blocks in any one of the FPGA chip based development board.

Exercise – 3

Design and development of UART protocol logic block in any one of FPGA chip based development board.

Exercise – 4

Consider on board LEDS (any four) and timer logic block of cortex- M board. Write a program which enables LEDS to glow in different timing.

Exercise – 5

Consider on board switches and (2x16) LCD display develop a program which displays the status of switch activation.

Exercise – 6

Demonstrate GPIO based I/O interfacing by considering LM 35 temperature sensor and cortex- M board.

Exercise – 7

Development of one interfacing scheme which transmits data from one cortex- M board to another cortex- M board using on chip CAN logic blocks.

Exercise – 8

Consider on board EPROM IC of Cortex- M board by utilizing on chip I2c logic block transmit data to EPROM IC and receive stored data from EPROM IC.

Exercise – 9

Consider on board LEDs (4 Nos) of Cortex - M board. Demonstrate time management service concept of RTOS for glowing all four LEDS in different timings.


Exercise – 10

Consider two ultrasonic sensors which are interfaced with cortex- M board. Both are located some distance (2 meters) apart vertically so that the system can identify the movement of object in term of distance. consider data reception and display of each sensor as two different tasks by RTOS. Establish a RTOS based system to recognize the height of moving object.

LIST OF EQUIPMENTS REQUIRED

1. FPGA simulator tool
2. FPGA Trainer Board
3. LCD
4. Ultra Sonic Sensors

| | | | |
|------|-----|------|---------------|
| L:45 | T:0 | P:30 | T: 75 PERIODS |
|------|-----|------|---------------|


HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashpalayam, Tirupur-638660.

| | | | | | |
|----------|------------------------|---|---|---|---|
| 24PEC211 | VLSI DESIGN LABORATORY | L | T | P | C |
| | | 0 | 0 | 4 | 2 |

COURSE OBJECTIVES:

- Familiarize with different FPGA boards
- Analyze digital design using Front end Tools
- Analyze the CMOS circuits using CAD tools
- Analyze the interfacing of I/O devices with Arduino Boards using Embedded C

PRACTICAL EXPERIMENTS

1. Synthesize and implement Combinational and Sequential Circuits in VERILOG / VHDL
2. Synthesize and implement MAC unit and GCD unit in Verilog /VHDL
3. Implementation of sampling of input signal and display in FPGA Synthesize and implement FIR filter and IIR filter Verilog /VHDL
4. Synthesize and implement 8 bit general purpose processor in Verilog/VHDL
5. Synthesize and implement UART and USART
6. Simulation and Analysis of CMOS sequence combinational and sequential logic circuits using CAD tools
7. Circuit and Analysis of PPA (Power Performance Analysis) using CAD tools

LIST OF EQUIPMENTS REQUIRED

1. PC with windows 8 or above
2. Xilinx ISE/Altera Quartus/ equivalent EDA Tools along with Xilinx/Altera/equivalent FPGA Boards
3. Cadence/Synopsis/ Mentor Graphics/Tanner/equivalent EDA Tools

| | | | |
|-----|-----|------|---------------|
| L:0 | T:0 | P:60 | T: 60 PERIODS |
|-----|-----|------|---------------|

COURSE OUTCOMES

At the end of the course students should be able to


CO1: Program in Verilog/VHDL for combinational and sequential circuits and implement the program in FPGA.

CO2: Implement FIR and IIR filters in FPGA.

CO3: Implement data path design and interfaces.

CO4: Handle CAD tools to draw/edit, and analyze the CMOS circuits.

CO5: Program and interface the Arduino Boards using Embedded C.


HEAD OF THE DEPARTMENT
 Department of ECE
Jai Shriram Engineering College
 Avinashipalayam, Tirupur-638660.

REFERENCES

- Bruce Powel Douglas, "Real time UML, second edition: Developing efficient objects for embedded systems", 3rd Edition 1999, Pearson Education
- Daniel W. Lewis, "Fundamentals of embedded software where C and assembly meet", Pearson Education, 2002.
- Frank Vahid and Tony Gwargie, "Embedded System Design", John Wiley & sons, 2002.
- Steve Heath, "Embedded System Design", Elsevier, Second Edition, 2004

COURSE OUTCOMES

At the end of the course students should be able to

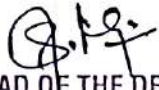
CO1: Able to design an Embedded system.

CO2: Understand a general and single purpose processor.

CO3: Explain different protocols.

CO4: Discuss state machine and design process models.

CO5: Outline embedded software development tools and RTOS.


HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashipalayam, Tirupur-638660.

CONTROLLED COPY



JAI SHRIRAM ENGINEERING COLLEGE, TIRUPPUR – 638 660
(An Autonomous Institution)

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai
Recognized by UGC & Accredited by NAAC and NBA (CSE and ECE)




REGULATIONS 2024

M.E. APPLIED ELECTRONICS

CHOICE BASED CREDIT SYSTEM

SYLLABUS FOR SEMESTER III

PROFESSIONAL ELECTIVE I


HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashipalayam, Tirupur-638660.

| | | | | | |
|-----------|--|---|---|---|---|
| 24PECP201 | APPLICATIONS SPECIFIC INTEGRATED CIRCUITS | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

COURSE OBJECTIVES:

- To prepare the student to be an entry-level industrial standard ASIC or FPGA designer.
- To analyze the issues and tools related to ASIC/FPGA design and implementation
- To understand basics of System on Chip and Platform based design

| | | |
|--|--|----------|
| UNIT I | INTRODUCTION TO ASICS, CMOS LOGIC AND ASIC LIBRARY DESIGN | 9 |
| Types of ASICs - Design flow - CMOS transistors - Combinational Logic Cell – Sequential logic cell-Data path logic cell - Transistors as Resistors - Transistor Parasitic Capacitance- Logical effort. | | |

| | | |
|--|--|----------|
| UNIT II | PROGRAMMABLE ASICS, PROGRAMMABLE ASIC LOGIC CELLS AND PROGRAMMABLE ASIC I/O CELLS | 9 |
| Anti-fuse - static RAM - EPROM and EEPROM technology - Actel ACT - Xilinx LCA – Altera FLEX - Altera MAX DC & AC inputs and outputs - Clock & Power inputs - Xilinx I/O blocks | | |

| | | |
|---|---------------------------------------|----------|
| UNIT III | PROGRAMMABLE ASIC ARCHITECTURE | 9 |
| Architecture and configuration of Spartan / Cyclone and Virtex / Stratix FPGAs – Micro-Blaze / Niose based embedded systems – Signal probing techniques | | |

| | | |
|--|---|----------|
| UNIT IV | LOGIC SYNTHESIS, PLACEMENT AND ROUTING | 9 |
| Logic synthesis - ASIC floor planning- placement and routing – power and clocking strategies | | |

| | | |
|--|--|----------|
| UNIT V | HIGH PERFORMANCE ALGORITHMS FOR ASICs/ SOCs. SOC CASE STUDIES | 9 |
| DAA and computation of FFT and DCT. High performance filters using delta-sigma modulators. Case Studies: Digital camera, SDRAM, High speed data standards. | | |

| | | | |
|------|-----|-----|---------------|
| L:45 | T:0 | P:0 | T: 45 PERIODS |
|------|-----|-----|---------------|


 HEAD OF THE DEPARTMENT
 Department of ECE
 Jai Shriram Engineering College
 Avinashipalayam, Tirupur-638660.

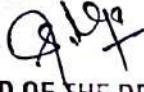
REFERENCES

1. David A.Patterson and John L. Hennessy, "Computer Organization and Design :The Hardware/Software Interface", Morgan Kaufmann / Elsevier, 5th Edition, 2014.(Unit I)
2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky and Naraig Manjikian, "Computer Organization and Embedded Systems", Tata McGraw Hill, 6th Edition, 2012.(Unit II)
3. William Stallings, "Computer Organization and Architecture– Designing for Performance", Pearson Education, 8th Edition
4. John P. Hayes, "Computer Architecture and Organization", Tata McGraw Hill, 3rd Edition, 2012.(Unit IV)
5. John L. Hennessy and David A.Patterson, "Computer Architecture A Quantitative Approach", Morgan Kaufmann / Elsevier Publishers, 5th Edition, 2012.(Unit V)

COURSE OUTCOMES

At the end of the course students should be able to

- CO 1: Understand the basic organization of computer and different instruction format and addressing modes.
- CO2: Interpret the representation and manipulation of data on the computer.
- CO3: Illustrate about implementation schemes of control unit and pipeline performance
- CO4: Summarize the various types of parallelism architectures.
- CO5: Compare the various memory hierarchy and I/O systems.


HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashipalayam, Tirupur-638660.

| | | | | | |
|-----------|---|---|---|---|---|
| 24PECP202 | COMPUTER ARCHITECTURE AND PARALLEL PROCESSING | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

COURSE OBJECTIVES:

- To prepare the student to be an entry-level industrial standard ASIC or FPGA designer.
- To analyze the issues and tools related to ASIC/FPGA design and implementation
- To understand basics of System on Chip and Platform based design

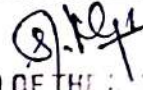
| | | |
|---|--|----------|
| UNIT-I | INTRODUCTION TO COMPUTER ORGANIZATION | 9 |
| Architecture and function of general computer system - Basic Operational Concepts, Bus Structures, Software Performance – Memory locations & addresses – Memory operations – Instruction and instruction sequencing – addressing modes – assembly language - System buses, Multi-bus organization | | |

| | | |
|--|----------------------------|----------|
| UNIT-II | DATA REPRESENTATION | 9 |
| Signed number representation, fixed and floating point representations, character representation. Computer arithmetic - integer addition and subtraction, ripple carry adder, carry look-ahead adder - multiplication - shift-and-add, Booth multiplier, carry save multiplier - Division - non-restoring and restoring techniques, floating point arithmetic. | | |

| | | |
|---|--|----------|
| UNIT-III | PROCESSOR ARCHITECTURE AND CONTROL UNIT | 9 |
| A Basic MIPS implementation – Building a Datapath – Control Implementation Scheme – Hardwired control – micro programmed control - Pipelining – Pipelined datapath and control – Handling Data Hazards & Control Hazards – Exceptions. Processor Architecture: Very Long Instruction Word (VLIW) Architecture, Digital Signal Processor Architecture, System on Chip (SoC) architecture, MIPS Processor and programming | | |

| | | |
|--|----------------------------|----------|
| UNIT-IV | PARALLEL PROCESSING | 9 |
| Parallel processing challenges – Flynn’s classification – Single Instruction Single Data (SISD), Multiple Instruction Multiple Data (MIMD), Single Instruction Multiple Data (SIMD), Single Program Multiple Data (SPMD), and Vector Architectures-Hardware multithreading – Multi core processors and other Shared Memory Multiprocessors - Introduction to Graphics Processing Units, Clusters, Warehouse Scale Computers and other Message-Passing Multiprocessors. | | |

| | | |
|---|---------------------------------|----------|
| UNIT-V | MEMORY & I/O SYSTEMS | 9 |
| Memory Hierarchy – memory technologies – cache memory – measuring and improving cache performance – virtual memory, Translation Look aside Buffers – Accessing I/O Devices – Interrupts – Direct Memory Access – Bus structure – Bus operation – Arbitration – Interface circuits – Universal Serial Bus. | | |

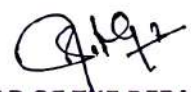

 HEAD OF THE DEPARTMENT
 Department of CSE
 Jai Shriram Engineering College
 Avinashipalayam, Tirupur-638660.

| | | |
|---|---------------------------------|----------|
| UNITV | MEMORY & I/O SYSTEMS | 9 |
| Memory Hierarchy – memory technologies – cache memory – measuring and improving cache performance – virtual memory, Translation Look aside Buffers – Accessing I/O Devices – Interrupts – Direct Memory Access – Bus structure – Bus operation – Arbitration – Interface circuits – Universal Serial Bus. | | |

| | | | |
|-------------|------------|------------|----------------------|
| L:45 | T:0 | P:0 | T: 45 PERIODS |
|-------------|------------|------------|----------------------|

| |
|--|
| REFERENCES |
| <ol style="list-style-type: none"> 1. David A.Patterson and John L. Hennessy, “Computer Organization and Design :The Hardware/Software Interface”, Morgan Kaufmann / Elsevier, 5th Edition, 2014.(Unit I) 2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky and Naraig Manjikian, “Computer Organization and Embedded Systems”, Tata McGraw Hill, 6th Edition, 2012.(Unit II) 3. William Stallings, “Computer Organization and Architecture– Designing for Performance”, Pearson Education, 8th Edition, 2010.(Unit III) 4. John P. Hayes, “Computer Architecture and Organization”, Tata McGraw Hill,3rdEdition, 2012.(Unit IV) 5. JohnL. Hennessey and David A.Patterson, “Computer Architecture–A Quantitative Approach”, Morgan Kaufmann / Elsevier Publishers, 5th Edition, 2012.(Unit V) |

| |
|--|
| COURSE OUTCOMES |
| At the end of the course students should be able to |
| CO1: Understand the basic organization of computer and different instruction format sand addressing modes. |
| CO2: Interpret the representation and manipulation of data on the computer. |
| CO3: Illustrate about implementation schemes of control unit and pipeline performance. |
| CO4: Summarize the various types of parallelism architectures. |
| CO5: Compare the various memory hierarchy and I/O systems. |


HEAD OF THE DEPARTMENT
 Department of ECE
 Jai Shriram Engineering College
 Avinashpalayam, Tirupur-638660.

| | | | | | |
|-----------|------------------------|---|---|---|---|
| 24PECP203 | AUTOMOTIVE ELECTRONICS | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

| |
|---|
| COURSE OBJECTIVES: |
| <ul style="list-style-type: none"> To explain the principle of electronic management system and different sensors used in the systems. To know the concepts and develop basic skills necessary to diagnose automotive electronic problems. To know Starting, and charging, lighting systems, advanced automotive electrical systems. To include electronic accessories and basic computer control. To explore practically about the components present in an Automotive electrical and electronics system. |

| | | |
|--|---------------------|----------|
| UNIT I | FUNDAMENTALS | 9 |
| <p>Components for electronic engine management system, open and closed loop control strategies, PID control, Look up tables, introduction to modern control strategies like Fuzzy logic and adaptive control. Switches, active resistors, Transistors, Current mirrors/amplifiers, Voltage and current references, Comparator, Multiplier. Amplifier, filters, A/D and D/A converters.</p> | | |

| | | |
|---|-----------------------|----------|
| UNIT II | MODERN SENSORS | 9 |
| <p>Film sensors, micro-scale sensors, Particle measuring systems, Vibration Sensors, SMART sensors, Machine Vision, Multi-sensor systems Applications of Sensors: Applications and case studies of Sensors in Automobile Engineering, Aeronautics, Machine tools and Manufacturing processes.</p> | | |

| | | |
|---|------------------------|----------|
| UNIT III | CHARGING SYSTEM | 9 |
| <p>Generation of Direct Current- Shunt Generator Characteristics- Armature Reaction- Third Brush Regulation- Cutout. Voltage and Current Regulators- Compensated Voltage Regulator Alternators Principle and Constructional Aspects and Bridge Rectifiers- New Developments. Architecture and configuration of Spartan / Cyclone and Virtex / Stratix FPGAs – Micro-Blaze / Nios based embedded systems – Signal probing techniques</p> | | |

| | | |
|---|--|----------|
| UNIT IV | AUTOMOTIVE TRANSMISSION CONTROL SYSTEMS | 9 |
| <p>Transmission control - Cruise control – Braking control – Traction control – Suspension control – Steering control – Stability control – Integrated engine control</p> | | |

| | | |
|--|----------------------------|----------|
| UNIT V | ELECTRONICS SYSTEMS | 9 |
| <p>Current Trends in Automotive Electronic Engine Management System- Types of EMS Electromagnetic interference Suppression- Electromagnetic Compatibility- Electronic Dashboard Instruments- Onboard Diagnostic System- Security - Warning System infotainment and Telematics.</p> | | |

HEAD OF THE DEPARTMENT
 Department of ECE
 Jai Shriram Engineering College
 Avinashpalayam, Tirupur-638660.

| | | | |
|-------------|------------|------------|----------------------|
| L:45 | T:0 | P:0 | T: 45 PERIODS |
|-------------|------------|------------|----------------------|

REFERENCES

1. Allan Bonnick, "Automotive Computer Controlled Systems", Butterworth-Heinemann, Elsevier, I Edition, 2011. (Unit I)
2. Eric Chowanietz, "Automobile Electronics" by SAE Publications, 1995. (Unit II)
3. Tom Weather Jr and Cland C. Hunter, "Automotive Computers and Control System" Prentice H Inc., 1984 New Jersey. (Unit II, III)
4. R.K. Jurgen, "Automotive Electronics Handbook", McGraw Hill 2nd Edition, 1995. (Unit IV, V)
5. William B Ribbens, "Understanding Automotive Electronics", 5th edition Butterworth-Heinemann Woburn, 1998. (Unit V)

COURSE OUTCOMES

At the end of the course students should be able to

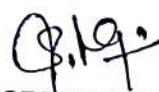
CO1: Explain the fundamentals, operation, function of various sensors and actuators in engine management systems.

CO2: Explain the Automotive Transmission Control Systems.

CO3: Enumerate the principles, application, construction and specification of different sensors and actuators usable in typical automobile by suitable testing

CO4: List out the principles and characteristics of charging system components and demonstrate their working with suitable tools.

CO5: Describe the principles and architecture of electronics systems and its components present in an automobile related to instrumentation, control, security and warning systems.


HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashipalayam, Tirupur-638660.

| | | | | | |
|-----------|----------|---|---|---|---|
| 24PECP204 | ROBOTICS | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

COURSE OBJECTIVES:

- To Introduce the concepts of Robotic systems
- To understand the concepts of Instrumentation and control related to Robotics
- To understand the kinematics and dynamics of robotics
- To explore robotics in Industrial applications

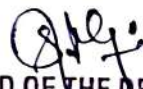
| | | |
|--|---------------------------------|----------|
| UNIT I | INTRODUCTION TO ROBOTICS | 9 |
| Robotics -History - Classification and Structure of Robotic Systems – Basic components - Degrees of freedom - Robot joints coordinates- Reference frames - workspace- Robot languages- Robotic sensors- proximity and range sensors, ultrasonic sensor, touch and slip sensor. | | |

| | | |
|--|--------------------------------------|----------|
| UNIT II | ROBOT KINEMATICS AND DYNAMICS | 9 |
| Kinematic Modelling Translation and Rotation Representation, Coordinate transformation, DH parameters, Forward and inverse kinematics, Jacobian, Dynamic Modelling: Forward and inverse dynamics, Equations of motion using Euler-Lagrange formulation, Newton Euler formulation | | |

| | | |
|---|-------------------------|----------|
| UNIT III | ROBOTICS CONTROL | 9 |
| Control of robot manipulator - state equations - constant solutions -linear feedback systems, single- axis PID control - PD gravity control -computed torque control, variable structure control and impedance control. | | |

| | | |
|--|---|----------|
| UNIT IV | ROBOT INTELLIGENCE AND TASK PLANNING | 9 |
| Artificial Intelligence - techniques - search problem reduction - predicate logic means and end analysis -problem solving -robot learning - task planning - basic problems in task planning - AI in robotics and Knowledge Based Expert System in robotics | | |

| | | |
|--|----------------------------|----------|
| UNIT V | INDUSTRIAL ROBOTICS | 9 |
| Robot cell design and control - cell layouts - multiple robots and machine interference - work cell design - work cell control - interlocks – error detection deduction and recovery - work cell controller- robot cycle time analysis. Safety in robotics, Applications of robot and future scope | | |


HEAD OF THE DEPARTMENT
 Department of ECE
Jai Shriram Engineering College
 Avinashipalayam, Tirupur-638660.

REFERENCES

1. John J. Craig, 'Introduction to Robotics (Mechanics and Control)', Addison-Wesley, 2nd Edition, 2004.(Unit I)
2. Richard D. Klafter, Thomas A. Chmielewski, Michael Negin, 'Robotics Engineering: An Integrated Approach', PHI Learning, New Delhi, 2009.(Unit II)
3. K.S.Fu, R.C.Gonzalez and C.S.G.Lee, 'Robotics Control, Sensing, Vision and Intelligence', Tata McGraw Hill, 2nd Reprint,2008..(Unit III)
4. Reza N.Jazar, 'Theory of Applied Robotics Kinematics, Dynamics and Control', Springer, 1st Indian Reprint, 2010..(Unit IV)
5. Mikell. P. Groover, Michell Weis, Roger. N. Nagel, Nicolous G.Odrey, 'Industrial Robotics Technology, Programming and Applications ', McGraw Hill, Int 2012.(Unit V)

L:45 | T:0 | P:0 | T: 45 PERIODS

COURSE OUTCOMES

At the end of the course students should be able to

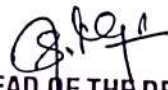
CO1 Describe the fundamentals of robotics.

CO2: Understand the concept of kinematics and dynamics in robotics.

CO3: Discuss the robot control techniques.

CO4 Explain the basis of intelligence in robotics and task planning.

CO5: Discuss the industrial applications of robotics


HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashipalayam, Tirupur-638660.

| | | | | | |
|-----------|---|---|---|---|---|
| 24PECP205 | SOFT COMPUTING AND OPTIMIZATION TECHNIQUES | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

COURSE OBJECTIVES:

- To classify various soft computing frame works.
- To be familiar with the design of neural networks, fuzzy logic, and fuzzy systems.
- To learn mathematical background for optimized genetic programming.
- Be exposed to neuro-fuzzy hybrid systems and its applications.
- To understand the various evolutionary optimization techniques.

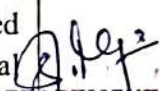
| | | |
|--|--------------------|----------|
| UNIT-I | FUZZY LOGIC | 9 |
| Introduction to Fuzzy logic - Fuzzy sets and membership functions- Operations on Fuzzy sets- Fuzzy relations, rules, propositions, implications, and inferences- Defuzzification techniques-Fuzzy logic controller design- Some applications of Fuzzy logic. | | |

| | | |
|---|-----------------------------------|----------|
| UNIT-II | ARTIFICIAL NEURAL NETWORKS | 9 |
| Supervised Learning: Introduction and how brain works, Neuron as a simple computing element, The perceptron, Back propagation networks: architecture, multilayer perceptron, back propagation learning-input layer, accelerated learning in multilayer perceptron, The Hopfield network, Bidirectional associative memories (BAM), RBF Neural Network. Unsupervised Learning: Hebbian Learning, Generalized Hebbian learning algorithm, Competitive learning, Self- Organizing Computational Maps: Kohonen Network. | | |

| | | |
|---|--------------------------|----------|
| UNIT-III | GENETIC ALGORITHM | 9 |
| Genetic algorithm- Introduction - biological background - traditional optimization and search techniques - Genetic basic concepts - operators – Encoding scheme – Fitness evaluation – crossover - mutation - Travelling Salesman Problem, Particle swarm optimization, Ant colony optimization | | |

| | | |
|--|-----------------------------|----------|
| UNIT-IV | NEURO-FUZZY MODELING | 9 |
| Adaptive Neuro-Fuzzy Inference Systems (ANFIS) – architecture - Coactive Neuro- Fuzzy Modeling, framework, neuron functions for adaptive networks – Data Clustering Algorithms – Rule base Structure Identification –Neuro-Fuzzy Control – the inverted pendulum system. | | |

| | | |
|---|---|----------|
| UNIT-V | CONVENTIONAL OPTIMIZATION TECHNIQUES | 9 |
| Introduction to optimization techniques, Statement of an optimization problem, classification, Unconstrained optimization-gradient search method-Gradient of a function, steepest gradient- conjugate gradient, Newton's Method, Marquardt Method, Constrained optimization –sequential linear programming, Interior penalty function method, external penalty function method. | | |


HEAD OF THE DEPARTMENT
 Department of ECE
 Jai Shriram Engineering College
 Avinashpalayam, Tirupur-638660.

| | | | |
|------|-----|-----|---------------|
| L:45 | T:0 | P:0 | T: 45 PERIODS |
|------|-----|-----|---------------|


REFERENCES

1. J.S.R.Jang, C.T.Sunand E.Mizutani, Neuro-Fuzzy and Soft Computing, PHI/Pearson Education2004.(Unit I)
2. David E. Goldberg, Genetic Algorithm sin Search, Optimization and Machine Learning, Addison wesley, 2009.(Unit II)
3. GeorgeJ. Klir and Bo Yuan, Fuzzy Sets and Fuzzy Logic-Theory and Applications, Prentice Hall, 1995.(Unit II,III)
4. James A.Freeman and David M.S kapura, Neural Networks Algorithms ,Applications, and Programming Techniques, Pearson Edn., 2003.(Unit III,IV)
5. Jyh-Shing Roger Jañg, Chuen-Tsai Sun,Eiji Mizutani, Neuro-Fuzzy and Soft Computing, Prentice-Hall of India, 2003.(Unit IV)
6. Mitchell Melanie, An Introduction to Genetic Algorithm, PrenticeHall,1998.(Unit IV)
7. Simon Haykins, Neural Networks :A Comprehensive Foundation, Prentice Hall International Inc, 1999.(Unit V)
8. Timothy J.Ross, Fuzzy Logic with Engineering Applications, McGraw-Hill,1997.(Unit V)

COURSE OUTCOMES

At the end of the course students should be able to

- CO1: Develop application on different soft computing techniques like Fuzzy, GA and Neural network.
- CO2: Implement Neuro-Fuzzy and Neuro-Fuzz-GA expert system.
- CO3: Implement machine learning through Neural networks.
- CO4: Model Neuro Fuzzy system for clustering and classification.
- CO5: Able to use the optimization techniques to solve the real world problems.


HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashpalayam, Tirupur-638660.

CONTROLLED COPY



JAI SHRIRAM ENGINEERING COLLEGE, TIRUPPUR – 638 660

(An Autonomous Institution)

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

Recognized by UGC & Accredited by NAAC and NBA (CSE and ECE)




REGULATIONS 2024

B. E. ELECTRONICS AND COMMUNICATION ENGINEERING

CHOICE BASED CREDIT SYSTEM

SYLLABUS FOR PROFESSIONAL ELECTIVE II


HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashpalayam, Tirupur-638660.

| | | | | | |
|-----------|------------------|---|---|---|---|
| 24PECP206 | RF SYSTEM DESIGN | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

COURSE OBJECTIVES:


- Be familiar with RF transceiver system design for wireless communications
- Be exposed to design methods of receivers and transmitters used in communication systems
- Design RF circuits and systems using an advanced design tool.
- Exemplify different synchronization methods circuits and describe their block schematic and design criteria
- Measure RF circuits and systems with a spectrum analyzer.

| | | |
|---|--|----------|
| UNIT-I | BASICS OF RADIO FREQUENCY SYSTEM DESIGN | 9 |
| <p>Definitions and models of Linear systems and Non-linear system. Specification parameters: Gain, noise figure, SNR, Characteristic impedance, S-parameters, Impedance matching and Decibels. Elements of digital base band signalling: complex envelope of band pass signals, Average value, RMS value, Crest factor, Sampling, jitter, modulation techniques, filters, pulse shaping, EVM, BER, sensitivity, selectivity, dynamic range and, adjacent and alternate channel power leakages</p> | | |

| | | |
|--|--|----------|
| UNIT-II | RADIO ARCHITECTURES AND DESIGN CONSIDERATIONS | 9 |
| <p>Superheterodyne architecture, direct conversion architecture, Low IF architecture, band-pass sampling radio architecture, System Design Considerations for an Analog Frontend Receiver in Cognitive Radio Applications, Interference, Near, In-band & wide-band considerations.</p> | | |

| | | |
|---|--|----------|
| UNIT-III | AMPLIFIER MODELING AND ANALYSIS | 9 |
| <p>Noise: Noise equivalent model for Radio frequency device, amplifier noise model, cascade performance, minimum detectable signal, performance of noisy systems in cascade. Non-Linearity: Amplifier power transfer curve, gain compression, AM-AM, AM-PM, polynomial approximations, Saleh model, Wiener model and Hammerstein model, intermodulation, Single and two tone analyses, second and third order distortions and measurements, SOI and TOI points, cascade performance of nonlinear systems.</p> | | |

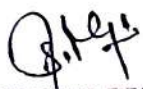
| | | |
|---|---|----------|
| UNIT-IV | MIXER AND OSCILLATOR MODELING AND ANALYSIS | 9 |
| <p>Mixers: Frequency translation mechanisms, frequency inversion, image frequencies, spurious calculations, principles of mixer realizations. Oscillators: phase noise and its effects, effects of oscillator spurious components, frequency accuracy, oscillator realizations: Frequency synthesizers, NCO</p> | | |


HEAD OF THE DEPARTMENT
 Department of ECE
 Jai Shriram Engineering College
 Avinashipalayam, Tirupur-638660.

| | | |
|--|---------------------------------------|----------|
| UNIT-V | APPLICATIONS OF SYSTEMS DESIGN | 9 |
| Multimode and multiband Superheterodyne transceiver: selection of frequency plan, receiver system and transmitter system design – Direct conversion transceiver: receiver system and transmitter system design | | |

| | | | |
|-------------|------------|------------|----------------------|
| L:45 | T:0 | P:0 | T: 45 PERIODS |
|-------------|------------|------------|----------------------|

| |
|---|
| REFERENCES |
| <p>1.The Design of CMOS Radio-Frequency Integrated Circuits by Thomas H. Lee. Cambridge University Press, 2004.</p> <p>2. Qizheng Gu, "RF System Design of Transceivers for Wireless Communications", Springer .2005.</p> <p>3. Kevin McClaning, "Wireless Receiver Design for Digital Communications," Yes Dee Publications, 2012.</p> <p>4. M C Jeruchim, P Balapan and K S Shanmugam, "Simulation of Communication systems: Modeling, Methodology and Techniques", Kluwer Academic/Plenum Publishers, 2nd Edition, 2000.</p> |
| COURSE OUTCOMES |
| <p>At the end of the course students should be able to</p> <p>CO1: understand the specifications of transceiver modules.</p> <p>CO2: understand pros and cons of transceiver architectures and their associated design considerations.</p> <p>CO3: understand the impact of noise and amplifier non-linearity of amplification modules and also will learn the resultant effect during cascade connections.</p> <p>CO4: get exposure about spurs and generation principles during signal generation and frequency translations.</p> <p>CO5: understand the case study of transceiver systems and aid to select specification parameters</p> |


 HEAD OF THE DEPARTMENT
 Department of ECE
 Jai Shriram Engineering College
 Avinashipalayam, Tirupur-638660.

| | | | | | |
|-----------|---|---|---|---|---|
| 24PECP207 | ELECTROMAGNETIC INTERFERENCE AND COMPATIBILITY | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

COURSE OBJECTIVES:

- To gain broad conceptual understanding of the various aspects of electromagnetic (EM) interference and compatibility
- To develop a theoretical understanding of electromagnetic shielding effectiveness
- To understand ways of mitigating EMI by using shielding, grounding and filtering
- To understand the need for standards and to appreciate measurement methods
- To understand how EMI impacts wireless and broadband technologies

| | | |
|--|--|----------|
| UNIT-I | INTRODUCTION & SOURCES OF EM INTERFERENCE | 9 |
| Introduction - Classification of sources - Natural sources - Man-made sources - Survey of the electromagnetic environment. | | |


| | | |
|---|---------------------|----------|
| UNIT-II | EM SHIELDING | 9 |
| Introduction - Shielding effectiveness - Far-field sources - Near-field sources - Low-frequency, magnetic field shielding - Effects of apertures. | | |

| | | |
|--|--|----------|
| UNIT-III | INTERFERENCE CONTROL TECHNIQUES | 9 |
| Equipment screening - Cable screening - grounding - Power-line filters - Isolation - Balancing - Signal-line filters - Nonlinear protective devices. | | |

| | | |
|--|--|----------|
| UNIT-IV | EMC STANDARDS, MEASUREMENTS AND TESTING | 9 |
| Need for standards - The international framework - Human exposure limits to EM fields -EMC measurement techniques - Measurement tools - Test environments. | | |

| | | |
|---|--|----------|
| UNIT-V | EMC CONSIDERATIONS IN WIRELESS AND BROADBAND TECHNOLOGIES | 9 |
| Efficient use of frequency spectrum - EMC, interoperability and coexistence - Specifications and alliances - Transmission of high-frequency signals over telephone and power networks – EMC and digital subscriber lines - EMC and power line telecommunications. | | |

| | | | |
|------|-----|-----|---------------|
| L:45 | T:0 | P:0 | T: 45 PERIODS |
|------|-----|-----|---------------|


 HEAD OF THE DEPARTMENT
 Department of ECE
 Jai Shriram Engineering College
 Avinashipalayam, Tirupur-638660.

REFERENCES

1. Christopoulos C, Principles and Techniques of Electromagnetic Compatibility, CRC Press, Second Edition, Indian Edition, 2013.
2. Paul C R, Introduction to Electromagnetic Compatibility, Wiley India, Second Edition, 2008.
3. Kodali V P, Engineering Electromagnetic Compatibility, Wiley India, Second Edition, 2010
4. Henry W Ott, Electromagnetic Compatibility Engineering, John Wiley & Sons Inc, Newyork, 2009
5. Scott Bennett W, Control and Measurement of Unintentional Electromagnetic Radiation, John Wiley & Sons Inc., Wiley Inter science Series, 1997.

COURSE OUTCOMES

At the end of the course students should be able to

- CO1: Demonstrate knowledge of the various sources of electromagnetic interference.
- CO2: Display an understanding of the effect of how electromagnetic fields couple through apertures, and solve simple problems based on that understanding.
- CO3: Explain the EMI mitigation techniques of shielding and grounding.
- CO4: Explain the need for standards and EMC measurement methods.
- CO5: Discuss the impact of EMC on wireless and broadband technologies.



HEAD OF THE DEPARTMENT
Department of ECE
JSS Sirsiya Engineering College
Amnashigatagon, Bangalore-530000.

| | | | | | |
|-----------|------------------------|---|---|---|---|
| 24PECP208 | VLSI DESIGN TECHNIQUES | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

| |
|---|
| COURSE OBJECTIVES: |
| <ul style="list-style-type: none"> To understand the basics I-V characteristics of MOS transistor To introduce the VLSI design flow To Design combinational and sequential circuits To introduce testing of VLSI circuits To explore system design using Verilog HDL |

| | | |
|---|------------------------|----------|
| UNIT-I | CMOS TECHNOLOGY | 9 |
| MOS transistor, Ideal I-V characteristics, C-V characteristics, non-ideal I-V effects – CMOS Inverter and Pass transistor DC transfer characteristics – CMOS technologies, Layout design Rules – Stick Diagram – CMOS process enhancements– VLSI design Flow. | | |


| | | |
|--|---|----------|
| UNIT-II | CIRCUIT DELAY, POWER, INTERCONNECT AND VERILOG HDL | 9 |
| Delay estimation – Logical effort and Transistor sizing – Power dissipation – Interconnect – Design margin –Reliability – Scaling – SPICE – Device models. Verilog: Procedural assignments –conditional statements – Design of combinational and sequential circuits using different types of modeling –Test benches. | | |

| | | |
|---|--|----------|
| UNIT-III | COMBINATIONAL AND SEQUENTIAL CIRCUIT DESIGN | 9 |
| Circuit families –Circuit Pitfalls – Sequencing static circuits, Max-min delay constraints, Time borrowing, Clock Skew – circuit design of latches and flip flops – synchronizers, Metastability, communication between asynchronous clock domains. | | |

| | | |
|--|---------------------|----------|
| UNIT-IV | CMOS TESTING | 9 |
| Need for testing – Testers, Test fixtures and test programs – Logic verification – Silicon debug principles –Manufacturing test – Design for testability – Boundary scan test. | | |

| | | |
|--|--|----------|
| UNIT-V | SYSTEM DESIGN USING VERILOG HDL | 9 |
| Basic concepts- identifiers- gate primitives- gate delays- operators timing controls- procedural assignments-conditional statements- Design of combinational and sequential circuits using Data flow- structural gate level- switch level modeling and Behavioral modeling-Test benches. | | |

| | | | |
|-------------|------------|------------|----------------------|
| L:45 | T:0 | P:0 | T: 45 PERIODS |
|-------------|------------|------------|----------------------|


HEAD OF THE DEPARTMENT
 Department of ECE
Jai Shriram Engineering College
 Avinashpalayam, Tirupur-638660.

REFERENCES

1. Weste and Harris: "CMOS VLSI DESIGN" 4th Edition, Pearson Education, 2013
2. Uyemura J.P: "Introduction to VLSI circuits and systems", Wiley 2002
3. D.A Pucknell & K.Eshraghian, "Basic VLSI Design", 3rd Edition, PHI, 2003
4. Wayne Wolf, "Modern VLSI design", 4th edition Pearson Education, 2009
5. M.J.S.Smith,"Application specific integrated circuits",1st edition, Addison-Wesley Professional,1997
- 6.Ciletti, "Advanced Digital Design with the Verilog HDL", 2nd edition, Pearson Education 2010

COURSE OUTCOMES

At the end of the course students should be able to


CO1: Analyze the characteristics of CMOS transistor.

CO2: Identify the methods to distribute clock and reduce power dissipation in CMOS circuits.

CO3: Design combinational and sequential circuits.

CO4: Analyze the methods to test the CMOS circuits.

CO5: Synthesize the combinational and sequential circuits using Verilog HDL.


HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashipalayam, Tirupur-638660.

| | | | | | |
|-----------|-------------------|---|---|---|---|
| 24PECP209 | NANO TECHNOLOGIES | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

COURSE OBJECTIVES:

- To introduce the basics of nano electronics
- To understand the basics of semiconductor materials
- To understand the basics of MOSFETS and its application in nano electronics
- To learn the advanced nanoscale devices
- To explore about Biosensors

| | | |
|---|---|----------|
| UNIT-I | INTRODUCTION TO NANO ELECTRONICS | 9 |
| Introduction to nanoelectronics, Limitations of conventional microelectronics. Classical Particles, Classical Waves and Quantum Particles-Quantum Mechanics of Electronics - Schrödinger wave equation. | | |


| | | |
|--|---------------------------------------|----------|
| UNIT-II | MATERIALS FOR NANO ELECTRONICS | 9 |
| Introduction- Semiconductors, Crystal lattices: Bonding in crystals- Electron energy bands- Semiconductor heterostructures-Lattice-matched and pseudo morphic heterostructures-Carbon nanomaterials: nanotubes and fullerenes. | | |

| | | |
|--|-------------------------------|----------|
| UNIT-III | SHRINK-DOWN APPROACHES | 9 |
| Moore's Law- Technology Scaling and Reliability Challenges. Basic MOS Transistor-Types, Modes of operation, n-MOS operation, Drain Current, Threshold Voltage, Energy band diagram of MOSFET, nanoscale MOSFET, SCEs-limits to scaling, system integration limits. | | |

| | | |
|---|-----------------------------------|----------|
| UNIT-IV | ADVANCED NANOSCALE DEVICES | 9 |
| Double Gate MOSFETs, Tri-Gate MOSFETs, Tunnel FETs-Multi-Gate TFETs and Heterojunction TFETs- Graphene and Carbon Nanotube Transistors. | | |

| | | |
|--|-----------------------------|----------|
| UNIT-V | FET BASED BIOSENSORS | 9 |
| Principles- Components of biosensor-Classification of Biosensors based on transducers, FET based Biosensor- ion-sensitive field effect transistor-operation and fabrication-Characteristics and Performance. | | |

| | | | |
|------|-----|-----|---------------|
| L:45 | T:0 | P:0 | T: 45 PERIODS |
|------|-----|-----|---------------|


HEAD OF THE DEPARTMENT
 Department of ECE
 Jai Shriram Engineering College
 Avinashpalayam, Tirupur-638660.

REFERENCES

- 1.G.W. Hanson, Fundamentals of Nanoelectronics, Pearson, 2009.
- 2.Vladimir V. Mitin, Viatcheslav A. Kochelap, Michael A. Stroscio, "Introduction to Nanoelectronics: Science, Nanotechnology, Engineering, and Applications", Cambridge University Press 2011.
- 3.Pierre R. Coulet, Loïc J. Blum, Biosensor Principles and Applications, CRC press-2019.
- 4.Donald A. Neamen, "Semiconductor Physics and Devices Basic Principles", Third Edition, McGraw-Hill Higher- Education, 2003.

COURSE OUTCOMES

At the end of the course students should be able to


CO1: Understand the basic concepts of nano electronics and various aspects of nano electronics.

CO2: Summarize the basic knowledge of Semiconductor materials and carbon nano tubes.

CO3: Understand the basic concepts of MOS scaling.

CO4: understand the advanced nanoscale devices.

CO5: Understand the Bio sensor devices.


HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashpalayam, Tirupur-638660.

| | | | | | |
|-----------|--------------|---|---|---|---|
| 24PECP210 | VLSI TESTING | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

COURSE OBJECTIVES:

- To introduce the VLSI testing.
- To introduce logic and fault simulation and testability measures
- To study the test generation for combinational and sequential circuits
- To study the design for testability.
- To study the fault diagnosis

| | | |
|--|--------------------------------|----------|
| UNIT-I | INTRODUCTION TO TESTING | 9 |
| Introduction – VLSI Testing Process and Test Equipment – Challenges in VLSI Testing - Test Economics and Product Quality – Fault Modeling – Relationship Among Fault Models. | | |


| | | |
|---|--|----------|
| UNIT-II | LOGIC & FAULT SIMULATION & TESTABILITY MEASURES | 9 |
| Simulation for Design Verification and Test Evaluation – Modeling Circuits for Simulation – Algorithms for True Value and Fault Simulation – Soap Controllability and Observability | | |

| | | |
|--|--|----------|
| UNIT-III | TEST GENERATION FOR COMBINATIONAL AND SEQUENTIAL CIRCUITS | 9 |
| Algorithms and Representations – Redundancy Identification – Combinational ATPG Algorithms – Sequential ATPG Algorithms – Simulation Based ATPG – Genetic Algorithm Based ATPG | | |

| | | |
|--|-------------------------------|----------|
| UNIT-IV | DESIGN FOR TESTABILITY | 9 |
| Design for Testability Basics – Testability Analysis - Scan Cell Designs – Scan Architecture – Built-in Self-Test – Random Logic Bist – DFT for Other Test Objectives. | | |

| | | |
|--|------------------------|----------|
| UNIT-V | FAULT DIAGNOSIS | 9 |
| Introduction and Basic Definitions – Fault Models for Diagnosis – Generation of Vectors for Diagnosis – Combinational Logic Diagnosis - Scan Chain Diagnosis – Logic BIST Diagnosis. | | |

| | | | |
|-------------|------------|------------|----------------------|
| L:45 | T:0 | P:0 | T: 45 PERIODS |
|-------------|------------|------------|----------------------|


HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashpalayam, Tirupur-638660.

REFERENCES

1. Laung-Terng Wang, Cheng-Wen Wu and Xiaoqing Wen, "VLSI Test Principles and Architectures", Elsevier, 2017
2. Michael L. Bushnell and Vishwani D. Agrawal, "Essentials of Electronic Testing for Digital, Memory & Mixed-Signal VLSI Circuits" , Kluwer Academic Publishers, 2017.
3. Niraj K. Jha and Sandeep Gupta, "Testing of Digital Systems", Cambridge University Press, 2017.

COURSE OUTCOMES

At the end of the course students should be able to

CO1: Understand VLSI Testing Process.

CO 2: Develop Logic Simulation and Fault Simulation.

CO3: Develop Test for Combinational and Sequential Circuits.

CO4: Understand the Design for Testability.

CO5: Perform Fault Diagnosis.


HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashpalayam, Tirupur-638660.

| | | | | | |
|-----------|---------------------------------------|---|---|---|---|
| 24PECP211 | EDGE ANALYTICS AND INTERNET OF THINGS | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

| |
|---|
| COURSE OBJECTIVES: |
| <ul style="list-style-type: none"> To Understand the basis for intersection of IOT and Edge Analytics To Understand the IOT protocols and standards To comprehend the use of Machine Learning in Edge Analytics To gain understanding on the use of Deep Learning techniques for analytics To gain insight into edge analytics models and deployment |

| | | |
|---|----------------------------|----------|
| UNIT-I | INTRODUCTION TO IOT | 9 |
| Importance and Need for IoT - Application and Use cases of IoT - Overview of Industrial IoT - Intersection of IoT and Edge Analytics. | | |

| | | |
|---|----------------------------------|----------|
| UNIT-II | IOT PROTOCOLS AND SYSTEMS | 9 |
| IoT protocols and standards - Cloud IoT Infrastructure - Setup and program IoT device- Data Collection from IoT device. | | |

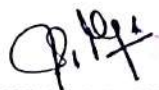
| | | |
|--|---|----------|
| UNIT-III | MACHINE LEARNING AND ARTIFICIAL INTELLIGENCE | 9 |
| Introduction to Machine Learning and Artificial Intelligence - Overview of Deep Learning and Neural Networks- Introduction to Convolution Neural Networks. | | |

| | | |
|--|--|----------|
| UNIT-IV | AUTO ENCODERS AND ITS PROGRAMMING | 9 |
| Introduction to Recurrent Neural Networks- Introduction to Auto Encoders- Programming Practice: Build Image Classifier, Build Anomaly Detector | | |

| | | |
|--|-----------------------|----------|
| UNIT-V | EDGE ANALYTICS | 9 |
| Challenges with Edge Devices and Deployment - Need for Model Quantization Quantization Aware Training- Post Model Quantization- Programming Practice: Model quantization, Deploying model on Edge Devices. | | |

| | | | |
|-------------|------------|------------|----------------------|
| L:45 | T:0 | P:0 | T: 45 PERIODS |
|-------------|------------|------------|----------------------|

| |
|---|
| REFERENCES |
| <ol style="list-style-type: none"> Honbo Zhou, "The Internet of Things in the Cloud: A Middleware Perspective", CRC Press, 2012. P. Flach, "Machine learning: The art and science of algorithms that make sense of data", Cambridge University Press, 2012. Anirudh Koul, Siddha Ganju, Meher Kasam, "Practical Deep Learning for Cloud, Mobile, and Edge" O'Reilly Media, 2019. |


 HEAD OF THE DEPARTMENT
 Department of ECE
 Jai Shriram Engineering College
 Avinashpalayam, Tirupur-638660.

4. Dieter Uckelmann, Mark Harrison, Florian Michahelles, "Architecting the Internet of Things", Springer, 2011.

COURSE OUTCOMES

At the end of the course students should be able to


CO1: Use the foundational concepts in Edge Analytics for application design and development.

CO2: Use IOT protocols in cloud environments.

CO3: Implement and use Machine Learning and Artificial Intelligence algorithms and tools.

CO4: Implement and use Deep Learning techniques for applications.

CO5: Analyze Edge devices analytics models and its challenges.


HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashipalayam, Tirupur-638660.

CONTROLLED COPY



JAI SHRIRAM ENGINEERING COLLEGE, TIRUPPUR – 638 660

(An Autonomous Institution)

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

Recognized by UGC & Accredited by NAAC and NBA (CSE and ECE)



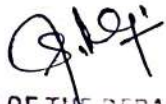
REGULATIONS 2024

M.E. APPLIED ELECTRONICS

CHOICE BASED CREDIT SYSTEM

SYLLABUS FOR SEMESTER III

PROFESSIONAL ELECTIVE III


HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashipalayam, Tirupur-638660.

| | | | | | |
|-----------|-------------------|---|---|---|---|
| 24PECP301 | QUANTUM COMPUTING | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

| | | | | | |
|---|--|--|--|--|--|
| COURSE OBJECTIVES: | | | | | |
| <ul style="list-style-type: none"> To introduce the building blocks of Quantum computers and highlight the paradigm change between conventional computing and quantum computing To understand the Quantum state transformations and the algorithms To understand entangled quantum subsystems and properties of entangled states To explore the applications of quantum computing | | | | | |

| | | |
|--|-------------------------|---|
| UNIT I | QUANTUM BUILDING BLOCKS | 9 |
| The Quantum Mechanics of Photon Polarization, Single-Qubit Quantum Systems, Quantum State Spaces, Entangled States, Multiple-Qubit Systems, Measurement of Multiple-Qubit States, EPR Paradox and Bell's Theorem, Bloch sphere | | |


| | | |
|---|-------------------------------|---|
| UNIT II | QUANTUM STATE TRANSFORMATIONS | 9 |
| Unitary Transformations, Quantum Gates, Unitary Transformations as Quantum Circuits, Reversible Classical Computations to Quantum Computations, Language for Quantum Implementations. | | |

| | | |
|---|--------------------|---|
| UNIT III | QUANTUM ALGORITHMS | 9 |
| Computing with Superpositions, Quantum Subroutines, Quantum Fourier Transformations, Shor's Algorithm and Generalizations, Grover's Algorithm and Generalizations | | |

| | | |
|---|---|---|
| UNIT IV | ENTANGLED SUBSYSTEMS AND ROBUST QUANTUM COMPUTATION | 9 |
| Quantum Subsystems, Properties of Entangled States, Quantum Error Correction, Graph states and codes, CSS Codes, Stabilizer Codes, Fault Tolerance and Robust Quantum Computing | | |

| | | |
|---|--------------------------------|---|
| UNIT V | QUANTUM INFORMATION PROCESSING | 9 |
| Limitations of Quantum Computing, Alternatives to the Circuit Model of Quantum Computation, Quantum Protocols, Building Quantum Computers, Simulating Quantum Systems, Bell states. Quantum teleportation. Quantum Cryptography, no cloning theorem | | |

| | | | |
|------|-----|-----|---------------|
| L:45 | T:0 | P:0 | T: 45 PERIODS |
|------|-----|-----|---------------|


 HEAD OF THE DEPARTMENT
 Department of ECE
 Jai Shriram Engineering College
 Avinashpalayam, Tirupur-638660.

REFERENCES

1. John Gribbin, Computing with Quantum Cats: From Colossus to Qubits, 2021
2. William (Chuck) Easttom, Quantum Computing Fundamentals, 2021
3. Parag Lala, Quantum Computing, 2019
4. Eleanor Rieffel and Wolfgang Polak, QUANTUM COMPUTING A Gentle Introduction, 2011
5. Nielsen M. A., Quantum Computation and Quantum Information, Cambridge University Press.2002
6. Benenti G., Casati G. and Strini G., Principles of Quantum Computation and Information, Vol. I: Basic Concepts, Vol II: Basic Tools and Special Topics, World Scientific. 2004
7. Pittenger A. O., An Introduction to Quantum Computing Algorithms 2000

COURSE OUTCOMES

At the end of the course students should be able to

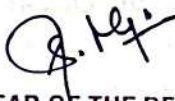
CO1: Understand the basic principles of quantum computing.

CO2: Gain knowledge of the fundamental differences between conventional computing and quantum computing.

CO3: Understand several basic quantum computing algorithms.

CO4: Understand the classes of problems that can be expected to be solved well by quantum computers.

CO5: Simulate and analyze the characteristics of Quantum Computing Systems.


HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashipalayam, Tirupur-638660.

| | | | | | |
|-----------|---------------------------------|---|---|---|---|
| 24PECP302 | VLSI FOR WIRELESS COMMUNICATION | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

COURSE OBJECTIVES:

- To understand the concepts of basic wireless communication concepts.
- To study the parameters in receiver and low noise amplifier design.
- To study the various types of mixers designed for wireless communication.
- To study and design PLL and VCO.
- To understand the concepts of transmitters and power amplifiers in wireless communication.

| | | |
|---|-------------------------------|----------|
| UNIT I | COMMUNICATION CONCEPTS | 9 |
| Introduction – Overview of Wireless systems – Standards – Access Methods – Modulation schemes – Classical channel – Wireless channel description – Path loss – Multipath fading – Standard Translation. | | |


| | | |
|---|---|----------|
| UNIT II | RECEIVER ARCHITECTURE & LOW NOISE AMPLIFIERS | 9 |
| Receiver front end – Filter design – Non-idealities – Design parameters – Noise figure & Input intercept point. LNA Introduction – Wideband LNA design – Narrow band LNA design: Impedance matching & Core amplifier. | | |

| | | |
|--|---------------|----------|
| UNIT III | MIXERS | 9 |
| Balancing Mixer - Qualitative Description of the Gilbert Mixer - Conversion Gain – Distortion – Noise - A Complete Active Mixer. Switching Mixer – Distortion, Conversion Gain & Noise in Unbalanced Switching Mixer - A Practical Unbalanced Switching Mixer. Sampling Mixer - Conversion Gain, Distortion, Intrinsic & Extrinsic Noise in Single Ended Sampling Mixer. | | |

| | | |
|---|-------------------------------|----------|
| UNIT IV | FREQUENCY SYNTHESIZERS | 9 |
| PLL – Phase detector – Dividers – Voltage Controlled Oscillators – LC oscillators – Ring Oscillators – Phase noise – Loop filters & design approaches – A complete synthesizer design example (DECT) – Frequency synthesizer with fractional divider. | | |

| | | |
|---|---|----------|
| UNIT V | TRANSMITTER ARCHITECTURES & POWER AMPLIFIERS | 9 |
| Transmitter back end design – Quadrature LO generator – Power amplifier design. | | |

| | | | |
|-------------|------------|------------|----------------------|
| L:45 | T:0 | P:0 | T: 45 PERIODS |
|-------------|------------|------------|----------------------|


HEAD OF THE DEPARTMENT
 Department of ECE
 Jai Shriram Engineering College
 Avinashpalayam, Tirupur-638660.

REFERENCES

1. Bosco H Leung "VLSI for Wireless Communication", Pearson Education, 2002.
2. B.Razavi, "RF Microelectronics", Prentice-Hall, 1998.
3. Behzad Razavi, "Design of Analog CMOS Integrated Circuits" McGraw-Hill, 1999.
4. Emad N Farag and Mohamed I Elmasry, "Mixed Signal VLSI wireless design – Circuits & Systems", Kluwer Academic Publishers, 2000.
5. J. Crols and M. Steyaert, "CMOS Wireless Transceiver Design," Boston, Kluwer Academic Pub., 1997.
6. Thomas H.Lee, "The Design of CMOS Radio – Frequency Integrated Circuits", Cambridge University Press, 2003

COURSEOUTCOMES

At the end of the course students should be able to

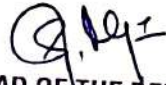
CO1: Able to recollect basic wireless communication concepts.

CO2: To understand the parameters in receiver and design a low noise amplifier.

CO3: In a position to apply his knowledge on various types of mixers designed for wireless communication.

CO4: Design PLL and VCO.

CO5: Understand the concepts of transmitters and utilize the power amplifiers in wireless communication.


HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashipalayam, Tirupur-638660.

| | | | | | |
|-----------|----------------------------------|---|---|---|---|
| 24PECP303 | MICRO ELECTRO MECHANICAL SYSTEMS | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

| |
|---|
| COURSE OBJECTIVES: |
| <ul style="list-style-type: none"> • To understand the operation of sensors and actuators • To understand the operation of major classes of MEMS devices/systems • To give the fundamentals of standard micro fabrication techniques and processes • To understand the unique demands, environments and applications of MEMS devices • To understand RF MEMS, Bio MEMS and MOEMS |

| | | |
|---|-----------------------------|----------|
| UNIT I | INTRODUCTION TO MEMS | 9 |
| Intrinsic Characteristics of MEMS – Energy Domains and Transducers- Sensors and Actuators – Introduction to Micro fabrication - Silicon based MEMS processes – New Materials – Review of Electrical and Mechanical concepts in MEMS – Semiconductor devices – Stress and strain analysis – Flexural beam bending- Torsional deflection. | | |


| | | |
|---|------------------------------|----------|
| UNIT II | SENSORS AND ACTUATORS | 9 |
| Electrostatic sensors – Parallel plate capacitors – Applications – Interdigitated Finger capacitor Piezoresistive sensors – Piezoresistive sensor materials - piezoelectric effects – piezoelectric materials-Stress analysis of mechanical elements – Thermal Sensing and Actuation – Thermal expansion – Thermal couples – Thermal resistors – Thermal Bimorph - Applications – Magnetic Actuators – Micromagnetic components | | |

| | | |
|---|-----------------------|----------|
| UNIT III | MICROMACHINING | 9 |
| Silicon Anisotropic Etching – Anisotropic Wet Etching – Dry Etching of Silicon – Plasma Etching – Deep Reaction Ion Etching (DRIE) – Isotropic Wet Etching – Gas Phase Etchants – Case studies –Basic surface micro machining processes – Structural and Sacrificial Materials – Acceleration of sacrificial Etch – Striction and Antistriction methods – LIGA Process - Assembly of 3D MEMS – Foundry process. | | |

| | | |
|--|---------------------------------|----------|
| UNIT IV | POLYMER AND OPTICAL MEMS | 9 |
| Polymers in MEMS – SU-8, PMMA, PDMS, Langmuir – Blodgett Films, Micro System fabrication – Photolithography – Ion implantation- Diffusion – Oxidation – Chemical vapour deposition – Etching- Optical MEMS – Lenses and Mirrors – Actuators for Active Optical MEMS. | | |

| | | |
|---|-------------------------------|----------|
| UNIT V | OVERVIEW OF MEMS AREAS | 9 |
| Bonding techniques for MEMS: Surface bonding, Anodic bonding, Silicon - on - Insulator, wire bonding, Sealing – Assembly of micro systems- RF MEMS - switches, active and passive components, Bio MEMS - Microfluidics, Digital Micro fluidics, Ink jet printer - MOEMS - optical switch, optical cross-connect, tunable VCSEL, micro bolometers. | | |

| | | | |
|-------------|------------|------------|----------------------|
| L:45 | T:0 | P:0 | T: 45 PERIODS |
|-------------|------------|------------|----------------------|


 HEAD OF THE DEPARTMENT
 Department of ECE
 Jai Shriram Engineering College
 Avinashipalayam, Tirupur-638660.

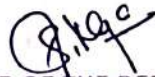
REFERENCES

1. Stephen D Senturia, 'Microsystem Design', Springer Publication, 2000.
2. Chang Liu, 'Foundations of MEMS', Pearson Education Inc., 2012.
3. Marc J. Madou, 'Fundamentals of Microfabrication: The Science of Miniaturization', Second Edition, 2002.
4. Nadim Maluf, " An Introduction to Micro Electro Mechanical System Design", Artech House, 2000.
5. Mohamed Gad-el-Hak, editor, " The MEMS Handbook", CRC press Baco Raton, 2001.

COURSE OUTCOMES

At the end of the course students should be able to

- CO1: Understand the working principles of micro sensors and actuators
- CO2: Understand the application of scaling laws in the design of micro systems.
- CO3: Understand the typical materials used for fabrication of micro machines
- CO4: Understand the principles of standard micro fabrication techniques
- CO5: Appreciate the challenges in the design and fabrication of RF, Bio, and MOEMS systems


HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashipalayam, Tirupur-638660.

| | | | | | |
|-----------|---------------------------|---|---|---|---|
| 24PECP304 | HARDWARE SECURE COMPUTING | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

COURSE OBJECTIVES

- Describe the fundamental principles in Data security
- Discuss the watermarking algorithms and its usage
- Explain the physical attacks and Modular arithmetic security methods
- Describe the memory based attacks and vulnerabilities using deceptive mechanisms
- Discuss the methods of FPGA implementation of cryptographic algorithms

| | | |
|--|--|----------|
| UNIT I | INTRODUCTION TO CRYPTO ALGORITHMS | 9 |
| Cryptography basics, Cryptographic algorithms - Symmetric Key algorithms, Public Key algorithms and Hash Algorithms, Data Encryption Standards, Advanced Encryption Standards, RSA, BowFish. | | |

| | | |
|--|--|----------|
| UNIT II | DESIGN INTELLECTUAL PROPERTY PROTECTION | 9 |
| Introduction to IP Protection, Watermarking Basics, Watermarking Examples, Good Watermarks, Fingerprinting, Hardware Metering. | | |

| | | |
|---|--|----------|
| UNIT III | PHYSICAL ATTACKS AND MODULAR EXPONENTIATION | 9 |
| Physical Attacks (PA) Basics, Physical Attacks and Countermeasures, Building Secure Systems, Modular Exponentiation (ME) Basics, ME in Cryptography, ME Implementation and Vulnerability, Montgomery Reduction. | | |

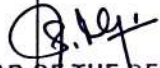
| | | |
|---|-------------------------------------|----------|
| UNIT IV | ATTACKS AND COUNTER MEASURES | 9 |
| Introduction to Side Channel Attacks, Memory Vulnerabilities and Cache Attacks, Power Analysis, More Attacks and Countermeasures, Modified Modular Exponentiation, Hardware Trojan (HT) and Trusted IC, Hardware Trojan Taxonomy, Hardware Trojan Detection Overview, Hardware Trojan Detection Methods, Trusted IC Design with HT Prevention | | |

| | | |
|--|------------------------------|----------|
| UNIT V | EMERGING TECHNOLOGIES | 9 |
| FPGA Implementation of Crypto algorithms, Vulnerabilities and Countermeasures in FPGA Systems, Role of Hardware in Security and Trust, Physical Unclonable Functions (PUF) Basics, Reliability, Trust Platform Modules | | |

| | | | |
|------|-----|-----|---------------|
| L:45 | T:0 | P:0 | T: 45 PERIODS |
|------|-----|-----|---------------|

REFERENCES

1. Debdeep Mukhopadhyay and Rajat Subhra Chakraborty, Hardware Security: Design, Threats and Safeguards, CRC Press,2014
2. Tehranipoor, Mohammad, Wang, Introduction to Hardware Security and Trust, Springer,2011.
3. Ted Huffnir, Handbook of FPGA Design Security, Springer,2010.
4. Stefan Mangard, Elisabeth Oswald, Thomas Popp, Power Analysis Attacks - Revealing the Secrets of Smart Cards, Springer,2007.
5. Doug Stinson, Cryptography Theory and Practice, CRC Press,2018.


 HEAD OF THE DEPARTMENT
 Department of ECE
 Jai Shriram Engineering Col
 Avinashipalayam, Tirupur-638

COURSE OUTCOMES

At the end of the course students should be able to

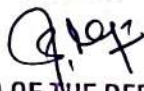
CO1: Understand the basics of Cryptography(K2)

CO2: Identify the mechanism of Data Integrity protection mechanisms(K2)

CO3: Analyse the counter measures for physical attacks and the use of Modular exponentiation(K2)

CO4: Study side channel attacks and Trojan-based attacks (K2)

CO5: Challenges in Realisation using VLSI implementations (K2)


HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashipalayam, Tirupur-638660.

| | | | | | |
|-----------|---------------------|---|---|---|---|
| 24PECP305 | CAD FOR VLSI DESIGN | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

COURSE OBJECTIVES:

- To introduce the VLSI design methodologies and design methods.
- To introduce data structures and algorithms required for VLSI design.
- To study algorithms for partitioning and placement.
- To study algorithms for floor planning and routing.
- To study algorithms for modelling, simulation and synthesis.

| | | |
|---------------|---------------------|----------|
| UNIT I | INTRODUCTION | 9 |
|---------------|---------------------|----------|

Introduction to VLSI Design Methodologies – VLSI Design Cycle – New Trends in VLSI Design Cycle – Physical Design Cycle – New Trends in Physical Design Cycle – Design Styles – Review of VLSI Design Automation Tools.

| | | |
|----------------|---|----------|
| UNIT II | DATA STRUCTURES AND BASIC ALGORITHMS | 9 |
|----------------|---|----------|

Introduction to Data Structures and Algorithms – Algorithmic Graph Theory and Computational Complexity – Tractable and Intractable Problems – General Purpose Methods for Combinatorial Optimization.

| | | |
|-----------------|--|----------|
| UNIT III | ALGORITHMS FOR PARTITIONING AND PLACEMENT | 9 |
|-----------------|--|----------|

Layout Compaction – Problem Formulation – Algorithms for Constraint Graph Compaction – Partitioning – Placement – Placement Algorithms.

| | | |
|----------------|---|----------|
| UNIT IV | ALGORITHMS FOR FLOORPLANNING AND ROUTING | 9 |
|----------------|---|----------|

Floorplanning – Problem Formulation – Floorplanning Algorithms – Routing – Area Routing – Global Routing – Detailed Routing.


| | | |
|---------------|--|----------|
| UNIT V | MODELLING, SIMULATION AND SYNTHESIS | 9 |
|---------------|--|----------|

Simulation – Gate Level Modeling and Simulation – Logic Synthesis and Verification – Binary Decision Diagrams – High Level Synthesis.

| | | | |
|-------------|------------|------------|----------------------|
| L:45 | T:0 | P:0 | T: 45 PERIODS |
|-------------|------------|------------|----------------------|

REFERENCES

1. Sabih H. Gerez, "Algorithms for VLSI Design Automation", Second Edition, Wiley-India, 2017.
2. Naveed a. Sherwani, "Algorithms for VLSI Physical Design Automation", 3rd Edition, Springer, 2017.
3. Charles J. Alpert, Dinesh P. Mehta and Sachin S Sapatnekar, "Handbook of Algorithms for Physical Design Automation, CRC Press, 1 st Edition, 2.
4. N.a. Sherwani, "Algorithms for VLSI Physical Design Automation", Kluwer Academic Publishers, 2002


HEAD OF THE DEPARTMENT
 Department of ECE
 Jai Shriram Engineering College
 Avinashipalayam, Tirupur-638660.

COURSE OUTCOMES

At the end of the course students should be able to


CO1: Use various VLSI design methodologies

CO2: Understand different data structures and algorithms required for VLSI design.

CO3: Develop algorithms for partitioning and placement.

CO4: Develop algorithms for floorplanning and routing.

CO5: Design algorithms for modelling, simulation and synthesis.



HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashipalayam, Tirupur-638660.

CONTROLLED COPY



JAI SHRIRAM ENGINEERING COLLEGE, TIRUPPUR – 638 660

(An Autonomous Institution)

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai
Recognized by UGC & Accredited by NAAC and NBA (CSE and ECE)




REGULATIONS 2024

M.E. APPLIED ELECTRONICS

CHOICE BASED CREDIT SYSTEM

SYLLABUS FOR

PROFESSIONAL ELECTIVE IV


HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashipalayam, Tirupur-638660.

| | | | | | |
|-----------|-----------------------|---|---|---|---|
| 24PECP306 | SENSORS AND ACTUATORS | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

| | | | | | |
|--|--|--|--|--|--|
| COURSE OBJECTIVES: | | | | | |
| <ul style="list-style-type: none"> • Understand static and dynamic characteristics of measurement systems. • Study various types of sensors. • Study different types of actuators and their usage. • Study State-of-the-art digital and semiconductor sensors. | | | | | |

| | | |
|--|--|----------|
| UNIT I | INTRODUCTION TO MEASUREMENT SYSTEMS | 9 |
| Introduction to measurement systems: general concepts and terminology, measurement systems, sensor classification, general input-output configuration, methods of correction, performance characteristics: static and dynamic characteristics of measurement systems, zero-order, firstorder, and second-order measurement systems and response. | | |

| | | |
|--|---------------------------------------|----------|
| UNIT II | RESISTIVE AND REACTIVE SENSORS | 9 |
| Resistive sensors: potentiometers, strain gages, resistive temperature detectors, magneto resistors, light-dependent resistors, Signal conditioning for resistive sensors: Wheatstone bridge, sensor bridge calibration and compensation, Instrumentation amplifiers, sources of interference and interference reduction, Reactance variation and electromagnetic sensors, capacitive sensors, differential, inductive sensors, linear variable differential transformers (LVDT), magneto elastic sensors, hall effect sensors, Signal conditioning for reactance-based sensors & application to LVDT. | | |

| | | |
|--|--------------------------------|----------|
| UNIT III | SELF-GENERATING SENSORS | 9 |
| Self-generating sensors: thermoelectric sensors, piezoelectric sensors, pyroelectric sensors, photovoltaic sensors, electrochemical sensors, Signal conditioning for self-generating sensors: chopper and low-drift amplifiers, offset and drifts amplifiers, electrometer amplifiers, charge amplifiers, noise in amplifiers. | | |

| | | |
|---|---|----------|
| UNIT IV | ACTUATORS DRIVE CHARACTERISTICS AND APPLICATIONS | 9 |
| Relays, Solenoid drive, Stepper Motors, Voice-Coil actuators, Servo Motors, DC motors and motor control, 4-to-20 mA Drive, Hydraulic actuators, variable transformers: synchros, resolvers, Inductosyn, resolver-to-digital and digital-to-resolver converters. | | |

| | | |
|---|---|----------|
| UNIT V | DIGITAL SENSORS AND SEMICONDUCTOR DEVICE SENSORS | 9 |
| Digital sensors: position encoders, variable frequency sensors – quartz digital thermometer, vibrating wire strain gages, vibrating cylinder sensors, Sensors based on semiconductor junctions: thermometers based on semiconductor junctions, magneto diodes and magneto transistors, MOSFET transistors, CCD imaging sensors, ultrasonic sensors, fiber-optic sensors | | |

HEAD OF THE DEPARTMENT
 Department of ECE
 Jai Shriram Engineering College
 Avinashpalayam, Tirupur-638660.

| | | | |
|-------------|------------|------------|----------------------|
| L:45 | T:0 | P:0 | T: 45 PERIODS |
|-------------|------------|------------|----------------------|

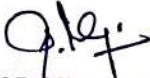
REFERENCES

1. Andrzej M. Pawlak Sensors and Actuators in Mechatronics Design and Applications, 2006.
2. D. Johnson, "Process Control Instrumentation Technology", 8th Ed, 2014, John Wiley and Sons.
3. D.Patranabis, "Sensors and Transducers", TMH 2003.
4. E.O. Doebelin, "Measurement System: Applications and Design", McGraw Hill publications,1996
5. Graham Brooker, Introduction to Sensors for ranging and imaging, Yesdee, 2009.
6. Herman K.P. Neubrat, "Instrument Transducers – An Introduction to Their Performance and Design", Oxford University Press. 22,1999.
7. Ian Sinclair, Sensors and Transducers, Elsevier, 3rd Edition, 2011.
8. Jon Wilson , "Sensor Technology Handbook", Newne 2004.
9. Kevin James, PC Interfacing and Data acquisition, Elsevier, 2011.
10. Ramon PallásAreny, John G. Webster, "Sensors and Signal conditioning", 2nd edition, John Wiley and Sons, 2000.
11. Sensors and Actuators: Control System Instrumentation, Clarence W. de Silva CRC Press, 2007

COURSE OUTCOMES

At the end of the course students should be able to

- CO 1: Compare Actuators with various drive characteristics
- CO2: Evaluate digital sensors and semiconductor device sensors performance metrics
- CO3: Characterize the performance of Self-generating sensors.
- CO4: Analyze the performance of self-generating Sensors.
- CO5: Analyze the performance of resistive and reactive sensors.


HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashipalayam, Tirupur-638660.

| | | | | | |
|-----------|---------------------------------------|---|---|---|---|
| 24PECP307 | SIGNAL INTEGRITY FOR HIGHSPEED DESIGN | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

COURSE OBJECTIVES:

- To identify sources affecting the speed of digital circuits.
- To introduce methods to improve the signal transmission characteristics

| | | |
|---------------|---|----------|
| UNIT I | SIGNAL PROPAGATION ON TRANSMISSION LINES | 9 |
|---------------|---|----------|

Transmission line equations, wave solution, wave vs. circuits, initial wave, delay time, Characteristic impedance, wave propagation, reflection, and bounce diagrams Reactive terminations – L, C, static field maps of micro strip and strip line cross-sections, per unit length parameters, PCB layer stackups and layer/Cu thicknesses, cross-sectional analysis tools, Zo and Td equations for microstrip and stripline Reflection and terminations for logic gates, fan-out, logic switching, input impedance into a transmission-line section, reflection coefficient, skin-effect, dispersion.

| | | |
|----------------|--|----------|
| UNIT II | MULTI-CONDUCTOR TRANSMISSION LINES AND CROSS-TALK | 9 |
|----------------|--|----------|

Multi-conductor transmission-lines, coupling physics, per unit length parameters, Near and far-end cross-talk, minimizing cross-talk (stripline and microstrip) Differential signalling, termination, balanced circuits, S-parameters, Lossy and Lossless models

| | | |
|-----------------|--------------------------|----------|
| UNIT III | NON-IDEAL EFFECTS | 9 |
|-----------------|--------------------------|----------|

Non-ideal signal return paths – gaps, BGA fields, via transitions, Parasitic inductance and capacitance, Transmission line losses – Rs, tan δ , routing parasitic, Common-mode current, differential-mode current, Connectors.


| | | |
|----------------|---|----------|
| UNIT IV | POWER CONSIDERATIONS AND SYSTEM DESIGN | 9 |
|----------------|---|----------|

SSN/SSO, DC power bus design, layer stack up, SMT decoupling, Logic families, power consumption, and system power delivery, Logic families and speed Package types and parasitic 56, SPICE, IBIS models, Bit streams, PRBS and filtering functions of link-path components, Eye diagrams, jitter, inter-symbol interference Bit-error rate, Timing analysis.

| | | |
|---------------|---|----------|
| UNIT V | CLOCK DISTRIBUTION AND CLOCK OSCILLATORS | 9 |
|---------------|---|----------|

Timing margin, Clock slew, low impedance drivers, terminations, Delay Adjustments, canceling parasitic capacitance, Clock jitter.

| | | | |
|-------------|------------|------------|----------------------|
| L:45 | T:0 | P:0 | T: 45 PERIODS |
|-------------|------------|------------|----------------------|


 HEAD OF THE DEPARTMENT
 Department of ECE
 Jai Shriram Engineering College
 Avinashpalayam, Tirupur-638660.

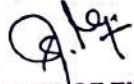
REFERENCES

1. H. W. Johnson and M. Graham, High-Speed Digital Design: A Handbook of Black Magic, Prentice Hall, 1993.
2. Douglas Brooks, Signal Integrity Issues and Printed Circuit Board Design, Prentice Hall PTR , 2003.
3. S. Hall, G. Hall, and J. McCall, High-Speed Digital System Design: A Handboo of Interconnect Theory and Design Practices, Wiley-Interscience, 2000.
4. Eric Bogatin, Signal Integrity – Simplified, Prentice Hall PTR, 2003.

COURSE OUTCOMES

At the end of the course students should be able to

- CO1: Identify sources affecting the speed of digital circuits.
- CO 2: Identify methods to improve the signal transmission characteristics.
- CO3: Characterise and model multiconductor transmission line
- CO4: Analyse clock distribution system and understand its design parameters
- CO5: Analyse nonideal effects of transmission line


HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashipalayam, Tirupur-638660.

| | | | | | |
|-----------|----------------------|---|---|---|---|
| 24PECP308 | CONSUMER ELECTRONICS | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

COURSE OBJECTIVES:

- To acquaint the students with the construction, theory and operation of the basic electronic devices such as PN junction diode, Bipolar and Field Effect Transistors, Power control devices etc.,
- To know about the working principle of LED, LCD and other Opto-electronic devices.
- To introduce the concept of Sensors and voice controls.
- To provide the knowledge on Smart home devices.
- To gain knowledge on current communication technology.

| | | |
|--|--|----------|
| UNIT I | CONSUMER ELECTRONICS FUNDAMENTALS | 9 |
| History of Electronic Devices- Vacuum Tubes, Transistors, Integrated Circuits- Moore Law, Semiconductor Devices, Diodes, Rectifiers, Transistors, Logic Gates, Combinational Circuits, ADC, DAC and Microprocessors, Microprocessor Vs Microcontrollers, Microcontrollers in consumer electronics, Energy management, Intelligent Building Perspective | | |

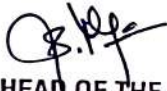
| | | |
|--|----------------------------------|----------|
| UNIT II | ENTERTAINMENT ELECTRONICS | 9 |
| Audio systems: Construction and working principle of: Microphone, Loud speaker, AM and FM receiver, stereo, Home theatre. Display systems: CRT, LCD, LED and Graphics displays Video Players: DVD and Blue RAY. Recording Systems: Digital Cameras and Camcorders. | | |

| | | |
|--|-----------------------------|----------|
| UNIT III | SMART HOME - SENSORS | 9 |
| Technology involved in Smart home, Home Virtual Assistants- Alexa and Google Home. Home Security Systems - Intruder Detection, Automated blinds, Motion Sensors, Thermal Sensors and Image Sensors, PIR, IR and Water Level Sensors. | | |

| | | |
|---|------------------------|----------|
| UNIT IV | HOME APPLIANCES | 9 |
| Home Enablement Systems: RFID Home, Lighting control, Automatic Cleaning Robots, Washing Machines, Kitchen Electronics- Microwave, Dishwasher, Induction Stoves, Smart Refrigerators, Smart alarms, Smart toilet, Smart floor, Smart locks. | | |

| | | |
|---|---|----------|
| UNIT V | INTRODUCTION TO SMART OS AND COMMUNICATION | 9 |
| Introduction to Smart OS- Android and iOS. Video Conferencing Systems- Web/IP Camera, Video security, Internet Enabled Systems, Wi-Fi, IoT, Li-Fi, GPS and Tracking Systems. Cordless Telephones, Fax Machines, PDAs- Tablets, Smart Phones and Smart Watches | | |

| | | | |
|------|-----|-----|---------------|
| L:45 | T:0 | P:0 | T: 45 PERIODS |
|------|-----|-----|---------------|


 HEAD OF THE DEPARTMENT
 Department of ECE
 Jai Shriram Engineering College
 Avinashpalayam, Tirupur-638660.

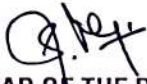
REFERENCES

1. Thomas L Floyd "Electronic Devices" 10th Edition Pearson Education Asia 2018.
2. Jordan Frith, " Smartphones as Locative Media ", Wiley. 2014.
3. Dennis C Brewer, " Home Automation", Que Publishing 2013.
4. Thomas M. Coughlin, "Digital Storage in Consumer Electronics", Elsevier and Newness 2012.
5. Nick vandome, Smart homes in easy steps, - Master smart technology for your home 2018.

COURSE OUTCOMES

At the end of the course students should be able to

- CO1: Explain the V-I characteristic of diode, UJT and SCR. Describe the equivalence circuits of transistors
- CO2: Operate the basic electronic devices such as PN junction diode, Bipolar and Field Effect Transistors, Power control devices, LED, LCD and other Opto-electronic devices.
- CO3: Gain knowledge on sensors and controls.
- CO4: Emphasize the need for communication systems
- CO5: Explore the current technology and apply on home applications.


HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashipalayam, Tirupur-638660.

| | | | | | |
|-----------|--|---|---|---|---|
| 24PECP309 | ADVANCED MICROPROCESSORS AND MICROCONTROLLERS ARCHITECTURES | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

COURSE OBJECTIVES:

- To expose the students to the fundamentals of microprocessor architecture.
- To explore the high performance features in CISC architecture
- To familiarize the high performance features in RISC architecture
- To introduce the basic features in Motorola microcontrollers.
- To enable the students to understand PIC Microcontroller

| | | |
|---|------------------------------------|----------|
| UNIT I | MICROPROCESSOR ARCHITECTURE | 9 |
| Instruction Set – Data formats –Addressing modes – Memory hierarchy –register file – Cache – Virtual memory and paging – Segmentation- pipelining –the instruction pipeline – pipeline hazards – instruction level parallelism – reduced instruction set –Computer principles – RISC versus CISC. | | |


| | | |
|---|---|----------|
| UNIT II | HIGH PERFORMANCE CISC ARCHITECTURE – PENTIUM | 9 |
| CPU Architecture- Bus Operations – Pipelining – Branch predication – floating point unit- Operating Modes –Paging – Multitasking – Exception and Interrupts – Instruction set – addressing modes – Programming the Pentium processor. | | |

| | | |
|--|---|----------|
| UNIT III | HIGH PERFORMANCE RISC ARCHITECTURE – ARM | 9 |
| Organization of CPU – Bus architecture –Memory management unit - ARM instruction set- Thumb Instruction set- addressing modes – Programming the ARM processor. | | |

| | | |
|--|--|----------|
| UNIT IV | MSP430 16 - BIT MICROCONTROLLER | 9 |
| The MSP430 Architecture- CPU Registers - Instruction Set, On-Chip Peripherals - MSP430 - Development Tools, ADC - PWM - UART - Timer Interrupts - System design using MSP430Microcontroller. | | |

| | | |
|--|----------------------------|----------|
| UNIT V | PIC MICROCONTROLLER | 9 |
| CPU Architecture – Instruction set – interrupts- Timers- I2C Interfacing –UART- A/D Converter – PWM and introduction to C-Compilers. | | |

| | | | |
|-------------|------------|------------|----------------------|
| L:45 | T:0 | P:0 | T: 45 PERIODS |
|-------------|------------|------------|----------------------|


 HEAD OF THE DEPARTMENT
 Department of ECE
 Jai Shriram Engineering College
 Avinashipalayam, Tirupur-638660.

REFERENCES

1. Daniel Tabak, „ Advanced Microprocessors” McGraw Hill.Inc., 1995
2. James L. Antonako, “The Pentium Microprocessor”, Pearson Education , 1997.
3. Steve Furbe, “ ARM System –On –Chip architecture”, Addison Wesley, 2000.
4. Gene .H.Miller.” Micro Computer Engineering ”, Pearson Education, 2003.
5. John .B.Peatman , “Design with PIC Microcontroller”, Prentice hall, 1997.
6. John H.Davis , “MSP 430 Micro controller basics”, Elsevier, 2008.
7. James L.Antonakos, “An Introduction to the Intel family of Microprocessors”, Pearson Education 1999.
8. Barry.B.Breg, “The Intel Microprocessors Architecture, Programming and Interfacing “, PHI,2002.
9. Valvano "Embedded Microcomputer Systems" Thomson Asia PVT LTD first reprint 2001.
10. Readings: Web links -- www.ocw.mit.edu, www.arm.com

COURSE OUTCOMES

At the end of the course students should be able to

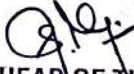
CO 1: To understand the fundamentals of microprocessor architecture.

CO 2: To know and appreciate the high performance features in CISC architecture.

CO 3: To know and appreciate the high performance features in RISC architecture

CO 4: To perceive the basic features in Motorola microcontrollers.

CO 5: To interpret and understand PIC Microcontroller.


HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashipalayam, Tirupur-638660.

| | | | | | |
|-----------|------------------------------|---|---|---|---|
| 24PECP310 | BIOMEDICAL SIGNAL PROCESSING | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

COURSE OBJECTIVES:

- Describe the properties and suitable models of biomedical signals
- Introduce the basic signal processing techniques in analyzing biomedical signals
- Develop computational skills in filtering of biomedical signals
- Develop an understanding on ECG signal compression algorithms
- Develop an understanding on feature extraction of biomedical signals

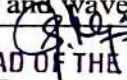
| | | |
|---|---|----------|
| UNIT I | INTRODUCTION TO BIOMEDICAL SIGNALS | 9 |
| Introduction to Biomedical Signals: The nature of Biomedical Signals, Examples of Biomedical Signals, Objectives and difficulties in Biomedical analysis. Electrocardiography: Basic electrocardiography, ECG lead systems, ECG signal characteristics. Signal Conversion :Simple signal conversion systems, Conversion requirements for biomedical signals, Signal conversion circuits | | |

| | | |
|---|-------------------------|----------|
| UNIT II | SIGNAL AVERAGING | 9 |
| Signal Averaging: Basics of signal averaging, signal averaging as a digital filter, a typical averager, software for signal averaging, limitations of signal averaging. Adaptive Noise Cancelling: Principal noise canceller model, 60-Hz adaptive cancelling using a sine wave model, other applications of adaptive filtering | | |

| | | |
|--|------------------------------------|----------|
| UNIT III | DATA COMPRESSION TECHNIQUES | 9 |
| Data Compression Techniques: Turning point algorithm, AZTEC algorithm, Fan algorithm, Huffman coding, data reduction algorithms The Fourier transform, Correlation, Convolution, Power spectrum estimation, Frequency domain analysis of the ECG | | |

| | | |
|--|--|----------|
| UNIT IV | CARDIOLOGICAL SIGNAL PROCESSING | 9 |
| Cardiological signal processing: Basic Electrocardiography, ECG data acquisition, ECG lead system, ECG signal characteristics (parameters and their estimation), Analog filters, ECG amplifier, and QRS detector, Power spectrum of the ECG, Bandpass filtering techniques, Differentiation techniques, Template matching techniques, A QRS detection algorithm, Realtime ECG processing algorithm, ECG interpretation, ST segment analyzer, Portable arrhythmia monitor | | |

| | | |
|---|---------------------------------------|----------|
| UNIT V | NEUROLOGICAL SIGNAL PROCESSING | 9 |
| Neurological signal processing: The brain and its potentials, The electrophysiological origin of brain waves, The EEG signal and its characteristics (EEG rhythms, waves, and transients), Correlation. Analysis of EEG channels: Detection of EEG rhythms, Template matching for EEG, spike and wave detection | | |


 HEAD OF THE DEPARTMENT
 Department of ECE
 Jai Shriram Engineering College
 Avinashpalayam, Tirupur-638660.

| | | | |
|------|-----|-----|---------------|
| L:45 | T:0 | P:0 | T: 45 PERIODS |
|------|-----|-----|---------------|

REFERENCES

1. Rangaraj M Rangayyan "Biomedical Signal Analysis – A case study approach" IEEE press series in biomedical engineering, First Edition, 2002
2. John G Proakis, Dimitris and G. Manolakis, "Digital Signal Processing Principles algorithms, applications" PHI Third Edition. 2006
3. Willis J. Tompkins " Biomedical Digital Signal Processing", EEE, PHI, 2004
4. D C Reddy "Biomedical Signal Processing: Principles and Techniques", Tata McGraw-Hill Publishing Co. Ltd, 2005
5. J G Webster "Medical Instrumentation: Application & Design", John Wiley & Sons Inc., 2001

COURSE OUTCOMES

At the end of the course students should be able to

- CO 1: Possess skills necessary to analyze ECG and EEG Signals
- CO 2: Apply classical and modern filtering techniques for ECG and EEG Signals
- CO 3: Apply classical and modern compression techniques for ECG and EEG Signals
- CO 4: Develop an understanding on ECG feature extraction
- CO 5: Develop an understanding on EEG feature extraction

HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashipalayam, Tirupur-638660.

CONTROLLED COPY



JAI SHRIRAM ENGINEERING COLLEGE, TIRUPPUR – 638 660
(An Autonomous Institution)

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai
Recognized by UGC & Accredited by NAAC and NBA (CSE and ECE)




REGULATIONS 2024

M.E. APPLIED ELECTRONICS

CHOICE BASED CREDIT SYSTEM

SYLLABUS FOR

PROFESSIONAL ELECTIVE V


HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashipalayam, Tirupur-638660.

| | | | | | |
|-----------|---------------------------------|---|---|---|---|
| 24PECP311 | MODELING AND SYNTHESIS WITH HDL | L | T | P | C |
| | | 3 | 0 | 2 | 4 |

COURSE OBJECTIVES:

- To know the basic language features of Verilog HDL and its the role in digital logic design.
- To know the behavioural modeling of combinational and sequential circuits.
- To know the behavioural modeling of algorithmic state machines.
- To know the synthesis of combinational and sequential descriptions.
- To know the architectural features of programmable logic devices.


| | | |
|---|--|----------|
| UNIT I | INTRODUCTION TO LOGIC DESIGN WITH VERILOG | 7 |
| Overview of Digital Design with Verilog HDL - Hierarchical Modeling Concepts: Top-down and bottom-up design methodology, differences between modules and module instances, parts of a simulation, design block, stimulus block - Basic Concept- Modules and Ports: Module definition, port declaration, connecting ports, hierarchical name referencing. Tasks and Functions. | | |

| | | |
|--|---------------------------|-----------|
| UNIT II | LEVELS OF MODELING | 12 |
| Gate-Level Modeling : Modeling using basic Verilog gate primitives, description of and/or and buff/not type gates, rise, fall and turn-off delays, min, max, and typical delays. Dataflow Modeling: Continuous assignments, delay specification, expressions, operators, operands, operator types. Behavioral Modeling: Structured procedures, initial and always, blocking and nonblocking statements, delay control, generate statement, event control, conditional statements, multiway branching, loops, sequential and parallel blocks. | | |

| | | |
|--|--|-----------|
| UNIT III | DESIGN OF DIGITAL LOGIC USING HDL | 12 |
| Design of combinational logic: adders, multiplexers, de-multiplexers, encoders and decoders, comparators, multipliers - Design of Sequential logic: Flip-flops, synchronous and Asynchronous counters, shift registers, Universal shift register, FSM and LFSR. (Using various Levels of Modeling) | | |

| | | |
|---|--|----------|
| UNIT IV | LOGIC SYNTHESIS AND DESIGN FLOW | 7 |
| Logic Synthesis with verilog HDL-Synthesis Design flow, RTL and Test Bench Modeling Techniques and Timing and Path Delay Modeling, Timing Checks, Switch Level Modeling | | |

| | | |
|--|-----------------------------------|----------|
| UNIT V | PROGRAMMABLE LOGIC DEVICES | 7 |
| Programmable logic devices, storage devices, programmable logic array programmable array logic, programmability of PLDs CPLDs. | | |


HEAD OF THE DEPARTMENT
 Department of ECE
 Jai Shriram Engineering College
 Avinashpalayam, Tirupur-638660.

PRACTICAL EXERCISES:**30 PERIODS**

1. Design Entry Using VHDL Or Verilog Using HDL Languages of
 - i. Combinational Circuits Namely 8:1 Mux/Demux, Full Adder, 8-Bit Magnitude Comparator, Encoder/Decoder, Priority Encoder.
 - ii. Sequential Circuits Namely D-FF, 4-Bit Shift Registers (SISO, SIPO, PISO, Bidirectional), 3- Bit Synchronous Counters.
2. Test Vector Generation And Timing Analysis of Sequential And Combinational Logic Design for exercise (1) above.
 2. Synthesis, P&R and Post P&R Simulation of the Components Simulated In (1) Above.
3. FPGA Implementation of PCI Bus & Arbiter.
Verifying Design Functionality Using Either Chipscope Feature (Xilinx) /the Signal Tap Feature (Altera)/Other Equivalent Feature . Invoke the PLL And Demonstrate the Use of the PLL Module for Clock Generation in FPGAs.

| | | | |
|------|-----|------|---------------|
| L:45 | T:0 | P:30 | T: 75 PERIODS |
|------|-----|------|---------------|


REFERENCES

1. Samir Palnitkar - Verilog HDL, 2nd edition, Pearson Education, 2003.
2. Michael D Ciletti - Advanced Digital Design with the VERILOG HDL, 2ND Edition, PHI, 2009.
3. Z Navabi - Verilog Digital System Design, 2nd Edition, McGraw Hill, 2005.
4. Stephen Brown and Zvonko Vranesic - Fundamentals of Digital Logic with Verilog, 2nd Edition, TMH, 2008.

COURSE OUTCOMES:

After successful completion of the course, the students are able to

- CO1: demonstrate knowledge on HDL design flow and digital circuits design.
CO2: design and develop the combinational and sequential circuits using various modeling
CO3: solving algorithmic state machines using hardware description language
CO4: analyze the process of synthesizing the combinational and sequential descriptions
CO5: know the advantages of programmable logic devices and their description in Verilog


HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashipur-638660.

| | | | | | |
|-----------|---------------|---|---|---|---|
| 24PECP312 | DEEP LEARNING | L | T | P | C |
| | | 3 | 0 | 2 | 4 |

COURSE OBJECTIVES:

- Develop and Train Deep Neural Networks.
- Develop a CNN, R-CNN, Fast R-CNN, Faster-R-CNN, Mask-RCNN for detection and recognition
- Build and train RNNs, work with NLP and Word Embeddings
- The internal structure of LSTM and GRU and the differences between them
- The Auto Encoders for Image Processing

| | | |
|---|-------------------------------|----------|
| UNIT-I | DEEP LEARNING CONCEPTS | 6 |
| Fundamentals about Deep Learning. Perception Learning Algorithms. Probabilistic modelling. Early Neural Networks. How Deep Learning different from Machine Learning. Scalars. Vectors. Matrixes, Higher Dimensional Tensors. Manipulating Tensors. Vector Data. Time Series Data. Image Data. Video Data. | | |

| | | |
|---|------------------------|----------|
| UNIT-II | NEURAL NETWORKS | 9 |
| About Neural Network. Building Blocks of Neural Network. Optimizers. Activation Functions. Loss Functions. Data Pre-processing for neural networks, Feature Engineering. Overfitting and Underfitting. Hyperparameters. | | |

| | | |
|--|-------------------------------------|-----------|
| UNIT-III | CONVOLUTIONAL NEURAL NETWORK | 10 |
| About CNN. Linear Time Invariant. Image Processing Filtering. Building a convolutional neural network. Input Layers, Convolution Layers. Pooling Layers. Dense Layers. Backpropagation Through the Convolutional Layer. Filters and Feature Maps. Backpropagation Through the Pooling Layers. Dropout Layers and Regularization. Batch Normalization. Various Activation Functions. Various Optimizers. LeNet, AlexNet, VGG16, ResNet. Transfer Learning with Image Data. Transfer Learning using Inception Oxford VGG Model, Google Inception Model, Microsoft ResNet Model. R-CNN, Fast R-CNN, Faster R-CNN, Mask-RCNN, YOLO | | |

| | | |
|---|--|-----------|
| UNIT-IV | NATURAL LANGUAGE PROCESSING USING RNN | 10 |
| About NLP & its Toolkits. Language Modeling. Vector Space Model (VSM). Continuous Bag of Words (CBOW). Skip-Gram Model for Word Embedding. Part of Speech (PoS) Global Co-occurrence Statistics-based Word Vectors. Transfer Learning. Word2Vec. Global Vectors for Word Representation GloVe. Backpropagation Through Time. Bidirectional RNNs (BRNN). Long ShortTerm Memory (LSTM). Bi-directional LSTM. Sequence-to-Sequence Models (Seq2Seq). Gated recurrent unit GRU. | | |

| | | |
|--|---|-----------|
| UNIT-V | DEEP REINFORCEMENT & UNSUPERVISED LEARNING | 10 |
| About Deep Reinforcement Learning. Q-Learning. Deep Q-Network (DQN). Policy Gradient Methods. Actor-Critic Algorithm. About Autoencoding. Convolutional Auto Encoding. Variational Auto Encoding. Generative Adversarial Networks. Autoencoders for Feature Extraction. Auto Encoders for Classification. Denoising Autoencoders. Sparse Autoencoders. | | |

8.19
 HEAD OF THE DEPARTMENT
 Department of ECE
 Jal Shri Ram Engineering College
 Avudayarai, Tirupur-638660.

| | | | |
|------|-----|------|---------------|
| L:45 | T:0 | P:30 | T: 75 PERIODS |
|------|-----|------|---------------|

PRACTICAL EXERCISES:

- 1: Feature Selection from Video and Image Data
- 2: Image and video recognition
- 3: Image Colorization
- 4: Aspect Oriented Topic Detection & Sentiment Analysis
- 5: Object Detection using Autoencoder


REFERENCES

1. Deep Learning A Practitioner's Approach Josh Patterson and Adam Gibson O'Reilly Media, Inc.2017.
2. Learn Keras for Deep Neural Networks, Jojo Moolayil, Apress,2018.
3. Deep Learning Projects Using TensorFlow 2, Vinita Silaparasetty, Apress, 2020.
4. Deep Learning with Python, FRANÇOIS CHOLLET, MANNING SHELTER ISLAND,2017.
5. Pro Deep Learning with TensorFlow, Santanu Pattanayak, Apress,2017.

COURSE OUTCOMES

At the end of the course students should be able to

- CO1: Feature Extraction from Image and Video Data
- CO2: Implement Image Segmentation and Instance Segmentation in Images
- CO3: Implement image recognition and image classification using a pretrained network (Transfer Learning)
- CO4: Traffic Information analysis using Twitter Data
- CO5: Autoencoder for Classification & Feature Extraction


HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashpalayam, Tirupur-638660.

| | | | | | |
|-----------|-----------------------------------|---|---|---|---|
| 24PECP313 | ADVANCED DIGITAL IMAGE PROCESSING | L | T | P | C |
| | | 3 | 0 | 2 | 4 |

COURSE OBJECTIVES:

- To understand the image fundamentals and mathematical transforms necessary for image processing and to study the image enhancement techniques.
- To understand the image segmentation and representation techniques.
- To understand how image are analyzed to extract features of interest.
- To introduce the concepts of image registration and image fusion.
- To analyze the constraints in image processing when dealing with 3D data sets.

| | | |
|--|---|----------|
| UNIT-I | FUNDAMENTALS OF DIGITAL IMAGE PROCESSING | 9 |
| Elements of visual perception, brightness, contrast, hue, saturation, mach band effect, 2D image transforms-DFT, DCT, KLT, and SVD. Image enhancement in spatial and frequency domain, Morphological image processing. | | |

| | | |
|--|---------------------|----------|
| UNIT-II | SEGMENTATION | 9 |
| Edge detection, Thresholding, Region growing, Fuzzy clustering, Watershed algorithm, Active contour methods, Texture feature-based segmentation, Model based segmentation, Atlas based segmentation, Wavelet based Segmentation methods. | | |

| | | |
|---|---------------------------|----------|
| UNIT-III | FEATURE EXTRACTION | 9 |
| First and second order edge detection operators, Phase congruency, Localized feature extraction detecting image curvature, shape features Hough transform, shape skeletonization, Boundary descriptors, Moments, Texture descriptors- Autocorrelation, Co-occurrence features, Run length features, Fractal model-based features, Gabor filter, wavelet features. | | |

| | | |
|--|--------------------------------------|----------|
| UNIT-IV | REGISTRATION AND IMAGE FUSION | 9 |
| Registration- Pre-processing, Feature selection-points, lines, regions and templates Feature Correspondence-Point pattern matching, Line matching, region matching Template matching. Transformation functions-Similarity transformation and Affine Transformation. Resampling-Nearest Neighbour and Cubic Splines Image Fusion-Overview of image fusion, pixel fusion, Multiresolution based fusion discrete wavelet transforms, Curvelet transform. Region based fusion. | | |

| | | |
|---|-------------------------------|----------|
| UNIT-V | 3D IMAGE VISUALIZATION | 9 |
| Sources of 3D Data sets, Slicing the Data set, Arbitrary section planes, The use of color, Volumetric display, Stereo Viewing, Ray tracing, Reflection, Surfaces, multiply connected surfaces, Image processing in 3D, Measurements on 3D images. | | |

| | | | |
|-------------|------------|------------|----------------------|
| L:45 | T:0 | P:0 | T: 45 PERIODS |
|-------------|------------|------------|----------------------|

HEAD OF THE DEPARTMENT
 Department of ECE
 Jai Shriram Engineering College
 Avinashpalayam, Tirupur-638660.

PRACTICAL EXERCISES:

1. Wavelet and DCT based Image Compression
2. Geometrical transformations and Interpolation of Images
3. Edge Detection using Canny edge detector
4. Region based , threshold based and Watershed Segmentation
5. Image filtering using DFT
6. Texture, Gabor and Wavelet Feature Extraction
7. Image fusion using Wavelets
8. Segmenting 3D Image volume using K-means clustering.
9. Segmentation of Lungs from 3D- Chest Scan.


REFERENCES

1. John C.Russ, "The Image Processing Handbook", CRC Press, 2007.
2. Mark Nixon, Alberto Aguado, "Feature Extraction and Image Processing", Academic Press, 2008.
3. Ardeshir Goshtasby, "2D and 3D Image registration for Medical, Remote Sensing and Industrial Applications", John Wiley and Sons, 2005.
4. Rafael C. Gonzalez, Richard E. Woods, Digital Image Processing', Pearson, Education, Inc., Second Edition, 2004.
5. Anil K. Jain, Fundamentals of Digital Image Processing', Pearson Education, Inc., 2002.
6. Rick S. Blum, Zheng Liu, "Multisensor image fusion and its applications ", Taylor & Francis, 2006.

COURSE OUTCOMES

At the end of the course students should be able to

- CO 1: To understand image formation and the role of human visual system plays in perception of gray and color image data.
- CO 2: To apply image processing techniques in both the spatial and frequency (Fourier) domains.
- CO 3: To design image analysis techniques in the form of image segmentation and to evaluate the methodologies for segmentation.
- CO 4: To conduct independent study and analysis of feature extraction techniques.
- CO 5: To understand the concepts of image registration and image fusion.
- CO 6: To analyze the constraints in image processing when dealing with 3D data sets and to apply image processing algorithms in practical applications.


HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashipalayam, Tirupur-638602.

| | | | | | |
|-----------|-------------------------|---|---|---|---|
| 24PECP314 | PCB DESIGN& FABRICATION | L | T | P | C |
| | | 3 | 0 | 2 | 4 |

COURSE OBJECTIVES:

- Understand the need for PCB Design and steps involved in PCB Design and Fabrication process.
- Familiarize Schematic and layout design flow using Electronic Design Automation (EDA) Tools.
- Understand basic concepts of transmission line, crosstalk and thermal issues
- Design (schematic and layout) PCB for analog circuits, digital circuits and mixed circuits.
- Schematic creation & interpretation

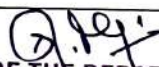
| | | |
|---|--|----------|
| UNIT-I | INTRODUCTION TO PRINTED CIRCUIT BOARD | 9 |
| Introduction to Printed circuit board: fundamental of electronic components, basic electronic circuits, Basics of printed circuit board designing: Layout planning, general rules and parameters, ground conductor considerations, thermal issues, check and inspection of artwork. | | |

| | | |
|---|-----------------------------|----------|
| UNIT-II | DESIGN RULES FOR PCB | 9 |
| Design rules for PCB: Design rules for Digital circuit PCBs, Analog circuit PCBs, high frequency and fast pulse applications, Power electronic applications, Microwave applications, PCB Technology Trends: Multilayer PCBs. Multiwire PCB, Flexible PCBs, Surface mount PCBs, Reflow soldering, Introduction to High-Density Interconnection (HDI) Technology. | | |

| | | |
|--|--|----------|
| UNIT-III | INTRODUCTION TO ELECTRONIC DESIGN AUTOMATION(EDA) TOOLS FOR PCB DESIGNING | 9 |
| Introduction to Electronic design automation (EDA) tools for PCB designing: Brief Introduction of various simulators, SPICE and PSPICE Environment, Selecting the Components Footprints as per design, Making New Footprints, Assigning Footprint to components, Net listing, PCB Layout Designing, Auto routing and manual routing. Assigning specific text (silkscreen) to design, Creating report of design, creating manufacturing data (GERBER) for design. | | |

| | | |
|---|---|----------|
| UNIT-IV | INTRODUCTION PRINTED CIRCUIT BOARD PRODUCTION TECHNIQUES | 9 |
| Introduction printed circuit board production techniques: Photo printing, film-master production, reprographic camera, basic process for double sided PCBs photo resists, Screen printing process, plating, relative performance and quality control, Etching machines, Solders alloys, fluxes, soldering techniques, Mechanical operations | | |

| | | |
|--|-------------------------------|----------|
| UNIT-V | PCB DESIGN FOR EMI/EMC | 9 |
| PCB design for EMI/EMC: Subsystem/PCB Placement in an enclosure, Filtering circuit placement, decoupling and bypassing, Electronic discharge protection, Electronic waste; Printed circuit boards Recycling techniques, Introduction to Integrated Circuit Packaging and footprints, NEMA and IPC standards. | | |


 HEAD OF THE DEPARTMENT
 Department of ECE
 Jai Shriram Engineering College
 Avinashipalayam, Tirupur-638660.

| | | | |
|------|-----|-----|---------------|
| L:45 | T:0 | P:0 | T: 45 PERIODS |
|------|-----|-----|---------------|

SUGGESTED ACTIVITIES:

1. Using any Electronic design automation (EDA) software, Practice following PCB Design steps (Open source EDA Tool KiCad Preferable or equivalent) Example circuit: Basic RC Circuit Schematic Design: Familiarization of the Schematic Editor, Schematic creation, Annotation, Netlist generation Layout Design: Familiarization of Footprint Editor, Mapping of components, Creation of PCB layout Schematic Create new schematic components Create new component footprints.
2. Fabricate single-sided PCB, mount the components and assemble in a cabinet for any one of the circuits mentioned below.
3. Regulator circuit using 7805.
4. Astable or Monostable multivibrator using IC555
5. RC Phase-shift or Wein-bridge Oscillator using transistor.
6. 4 bit binary /MOD N counter using D-Flip flops.
7. Design a 8051 Development board having Power section consisting of IC7805, capacitor, resistor, headers, LED, Serial communication section consisting of MAX 232, Capacitors, DB9 connector, Jumper, LEDs, Reset & Input/ output sections consisting of 89C51 Microcontroller, Electrolytic Capacitor, Resistor, Jumper, Crystal Oscillator, Capacitors.
8. Touch plate switches – transistorized or 555 based
9. Doorbell/cordless bell
10. Clapping switch and IR switch
11. Blinkers
12. Cell charger, battery charger, mobile charger
13. Fire/smoke/intruder alarm
14. Liquid level controller
15. Audio amplifiers

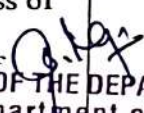
REFERENCES

1. Printed circuit board design, fabrication assembly and testing By R. S. Khandpur, Tata McGraw Hill 2006.
2. Printed Circuits Handbook, Sixth Edition, by Clyde F. Coombs, Jr, Happy T. Holden, Publisher: McGraw-Hill Education Year: 2016.
3. Complete PCB Design Using OrCAD Capture and PCB Editor, Kraig Mitzner Bob Doe Alexander Akulin Anton Suponin Dirk Müller, 2nd Edition 2009.
4. Introduction to System-on-Package, Rao R ,Tummala, & Madhavan Swaminathan, McGraw Hill, 2008.
5. EMC and Printed circuit board ,Design theory and layout, Mark I Montrose IEEE compatibility society.
6. Electronic Product Design Volume-I by S D Mehta, S Chand Publications.
7. Open source EDA Tool KiCad Tutorial: <http://kicad-pcb.org/help/tutorials/>
8. PCB Fabrication user guide page: <http://www.wikihow.com/Create-Printed-Circuit-Boards>, http://www.siongboon.com/projects/2005-09-07_home_pcb_fabrication/
9. http://reprap.org/wiki/MakePCBInstructions#Making_PCBs_yourself.

COURSE OUTCOMES

At the end of the course students should be able to

- CO1: Appreciate the necessity and evolution of PCB, types and classes of PCB.
- CO2: Understand the steps involved in schematic, layout, fabrication and assembly process of PCB design.
- CO3: Apply advanced techniques, skills and modern tools for designing and fabrication of PCBs.
- CO4: Apply the knowledge and techniques to fabricate Multilayer, SMT and HDI PCBs.
- CO5: Design (schematic and layout) and fabricate PCB for simple circuits.


HEAD OF THE DEPARTMENT
Department of ECE
Sriram Engineering College
Avinashipalayam, Tirupur-638660.

CONTROLLED COPY



JAI SHRIRAM ENGINEERING COLLEGE, TIRUPPUR – 638 660

(An Autonomous Institution)

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

Recognized by UGC & Accredited by NAAC and NBA (CSE and ECE)




REGULATIONS 2024

M.E. APPLIED ELECTRONICS

CHOICE BASED CREDIT SYSTEM

SYLLABUS FOR OPEN ELECTIVE


HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashipalayam, Tirupur-638660.

| | | | | | |
|----------|------------------------------|---|---|---|---|
| 24PCEO01 | ENVIRONMENTAL SUSTAINABILITY | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

COURSE OBJECTIVES:

- To prepare students to take responsibility of Environmental protection
- To emphasize the concept of sustainable development
- To emphasize the importance of biodiversity protection
- To gain knowledge on impact of industrial pollution on the environment
- To acquire interest to sustainable development and pollution economics

| | | |
|---|---------------------|----------|
| UNIT-I | INTRODUCTION | 9 |
| Valuing the Environment: Concepts, Valuing the Environment: Methods, Property Rights, Externalities, and Environmental Problems | | |

| | | |
|--|----------------------------------|----------|
| UNIT-II | CONCEPT OF SUSTAINABILITY | 9 |
| Sustainable Development: Defining the Concept, the Population Problem, Natural Resource Economics: An Overview, Energy, Water, Agriculture | | |

| | | |
|--|-------------------------------------|----------|
| UNIT-III | SIGNIFICANCE OF BIODIVERSITY | 9 |
| Biodiversity, Forest Habitat, Commercially Valuable Species, Stationary - Source Local Air Pollution, Acid Rain and Atmospheric Modification, Transportation | | |

| | | |
|---|--------------------------|----------|
| UNIT-IV | POLLUTION IMPACTS | 9 |
| Water Pollution, Solid Waste and Recycling, Toxic Substances and Hazardous Wastes, Global Warming | | |

| | | |
|---|--------------------------------|----------|
| UNIT-V | ENVIRONMENTAL ECONOMICS | 9 |
| Development, Poverty, and the Environment, Visions of the Future, Environmental economics and policy by Tom Tietenberg, Environmental Economics | | |

| | | | |
|-------------|--------------|--------------|--------------------------|
| L:45 | T: 00 | P: 00 | Total: 45 Periods |
|-------------|--------------|--------------|--------------------------|

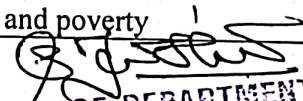
REFERENCES

1. Andrew Hoffman, 'Competitive Environmental Strategy - A Guide for the Changing Business Landscape, Island Press.
2. Stephen Doven, Environment and Sustainability Policy: Creation, Implementation, Evaluation, the Federation Press, 2005
3. Robert Brinkmann., Introduction to Sustainability, Wiley-Blackwell., 2016
4. Niko Roorda., Fundamentals of Sustainable Development, 3rd Edn, Routledge, 2020
5. Bhavik R Bakshi., Sustainable Engineering: Principles and Practice, Cambridge University Press, 2019

COURSE OUTCOMES

On successful completion of the course, the students will be able to

- CO1: Understand the value of environment and the hidden losses caused by pollution
CO2: Understand the real economics of sustainable development
CO3: Realize the loss of habitat and extinction of species due to pollution
CO4: Learn the irreversible impacts of pollution on the biosphere
CO5: Understand the impact of pollution on social life of humans and poverty


HEAD OF DEPARTMENT
Department of Civil Engg
JAI SHRIRAM ENGINEERING COLLEGE
Dharapuram Road, Avinashpalayam,
Tirupur-638663, Tamilnadu.

| | | | | | |
|----------|--|---|---|---|---|
| 24PCEO02 | VIBRATION AND NOISE CONTROL STRATEGIES | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

COURSE OBJECTIVES:

- To appreciate the basic concepts of vibration in damped and undamped systems
- To appreciate the basic concepts of noise, its effect on hearing and related terminology
- To use the instruments for measuring and analyzing the vibration levels in a body
- To use the instruments for measuring and analyzing the noise levels in a system
- To learn the standards of vibration and noise levels and their control techniques

| | | |
|--|----------------------------|----------|
| UNIT-I | BASICS OF VIBRATION | 9 |
| Introduction – Sources and causes of Vibration-Mathematical Models - Displacement, velocity and Acceleration - Classification of vibration: free and forced vibration, undamped and damped vibration, linear and non-linear vibration - Single Degree Freedom Systems - Vibration isolation – Determination of natural frequencies | | |

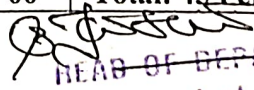
| | | |
|---|------------------------|----------|
| UNIT-II | BASICS OF NOISE | 9 |
| Introduction - Anatomy of human ear - Mechanism of hearing - Amplitude, frequency, wavelength and sound pressure level - Relationship between sound power, sound intensity and sound pressure level - Addition, subtraction and averaging decibel levels - sound spectra - Types of sound fields - Octave band analysis - Loudness. | | |

| | | |
|--|--|----------|
| UNIT-III | INSTRUMENTATION FOR VIBRATION MEASUREMENT | 9 |
| Experimental Methods in Vibration Analysis. - Vibration Measuring Instruments - Selection of Sensors - Accelerometer Mountings - Vibration Exciters - Mechanical, Hydraulic, Electromagnetic and Electrodynamics - Frequency Measuring Instruments -. System Identification from Frequency Response -Testing for resonance and mode shapes | | |

| | | |
|---|---|----------|
| UNIT-IV | INSTRUMENTATION FOR NOISE MEASUREMENT AND ANALYSIS | 9 |
| Microphones - Weighting networks - Sound Level meters, its classes and calibration - Noise measurements using sound level meters - Data Loggers - Sound exposure meters - Recording of noise - Spectrum analyser - Intensity meters - Energy density sensors - Sound source localization. | | |

| | | |
|--|---|----------|
| UNIT-V | METHODS OF VIBRATION CONTROL, SOURCES OF NOISE AND ITS CONTROL | 9 |
| Specification of Vibration Limits – Vibration severity standards - Vibration as condition Monitoring Tool – Case Studies - Vibration Isolation methods - Dynamic Vibration Absorber – Need for Balancing - Static and Dynamic Balancing machines – Field balancing - Major sources of noise - Noise survey techniques – Measurement technique for vehicular noise - Road vehicles Noise standard – Noise due to construction equipment and domestic appliances – Industrial noise sources and its strategies – Noise control at the source – Noise control along the path – Acoustic Barriers – Noise control at the receiver -- Sound transmission through barriers – Noise reduction Vs Transmission loss - Enclosures | | |

| | | | |
|-------------|--------------|--------------|--------------------------|
| L:45 | T: 00 | P: 00 | Total: 45 Periods |
|-------------|--------------|--------------|--------------------------|


 HEAD OF DEPARTMENT
 Department of Civil Engg
 JAI SHIRAM ENGINEERING COLLEGE
 Oharapuram Road, Avinashipalayam,
 Tirunelveli-632660, Tamilnadu.

REFERENCES

1. EIA Notification 2006 including recent amendments, by Ministry of Environment, Forest and Climate Change, Government of India
2. Sectoral Guidelines under EIA Notification by Ministry of Environment, Forest and Climate Change, Government of India
3. Canter, L.W., Environmental Impact Assessment, McGraw Hill, New York. 1996
4. Lawrence, D.P., Environmental Impact Assessment – Practical solutions to recurrent problems, Wiley-Interscience, New Jersey. 2003
5. Lee N. and George C. 2000. Environmental Assessment in Developing and Transitional Countries. Chichester: Willey
6. World Bank –Source book on EIA ,1999
7. Sam Mannan, Lees' Loss Prevention in the Process Industries, Hazard Identification Assessment and Control, 4th Edition, Butterworth Heineman, 2012.

COURSE OUTCOMES

On completion of the course, the student is expected to be able to

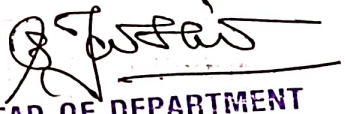
CO1: Understand need for environmental clearance, its legal procedure, need of EIA, its types, stakeholders and their roles

CO2: Understand various impact identification methodologies, prediction techniques and model of impacts on various environments

CO3: Understand relationship between social impacts and change in community due to development activities and rehabilitation methods

CO4: Document the EIA findings and prepare environmental management and monitoring plan

CO5: Identify, predict and assess impacts of similar projects based on case studies


HEAD OF DEPARTMENT
Department of Civil Engg
JAI SHRIRAM ENGINEERING COLLEGE
Dharapuram Road, Avinasipalayam,
Tirupur-638660. Tamilnadu.

| | | | | | |
|----------|---------------------------------------|---|---|---|---|
| 24PCEO03 | INTEGRATED WATER RESOURCES MANAGEMENT | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

COURSE OBJECTIVES:

- Students will be introduced to the concepts and principles of IWRM, which is inclusive of the economics, public-private partnership, water & health, water & food security and legal & regulatory settings.

| | | |
|--|-------------------------|----------|
| UNIT-I | CONTEXT FOR IWRM | 9 |
| Water as a global issue: key challenges – Definition of IWRM within the broader context of development – Key elements of IWRM - Principles – Paradigm shift in water management - Complexity of the IWRM process – UN World Water Assessment - SDGs. | | |

| | | |
|--|------------------------|----------|
| UNIT-II | WATER ECONOMICS | 9 |
| Economic view of water issues: economic characteristics of water good and services – Non-market monetary valuation methods – Water economic instruments – Private sector involvement in water resources management: PPP objectives, PPP models, PPP processes, PPP experiences through case studies. | | |

| | | |
|---|--------------------------------------|----------|
| UNIT-III | LEGAL AND REGULATORY SETTINGS | 9 |
| Basic notion of law and governance: principles of international and national law in the area of water management - Understanding UN law on non-navigable uses of international water courses – International law for groundwater management – World Water Forums – Global Water Partnerships - Development of IWRM in line with legal and regulatory framework. | | |

| | | |
|--|---|----------|
| UNIT-IV | WATER AND HEALTH WITHIN THE IWRM CONTEXT | 9 |
| Links between water and health: options to include water management interventions for health – Health protection and promotion in the context of IWRM – Global burden of Diseases – Health impact assessment of water resources development projects – Case studies. | | |

| | | |
|--|---|----------|
| UNIT-V | AGRICULTURE IN THE CONCEPT OF IWRM | 9 |
| Water for food production: ‘blue’ versus ‘green’ water debate – Water foot print - Virtual water trade for achieving global water and food security – Irrigation efficiencies, irrigation methods – current water pricing policy– scope to relook pricing. | | |

| | | | |
|-------------|--------------|--------------|--------------------------|
| L:45 | T: 00 | P: 00 | Total: 45 Periods |
|-------------|--------------|--------------|--------------------------|

REFERENCES

1. Cech Thomas V., Principles of water resources: history, development, management and policy. John Wiley and Sons Inc., New York. 2003.
2. Mollinga.P. etal “Integrated Water Resources Management”, Water in South Asia Volume I, Sage Publications, 2006.
3. Technical Advisory Committee, Integrated Water Resources management, Technical Advisory Committee Background Paper No: 4. Global water partnership, Stockholm, Sweden. 2002.
4. Technical Advisory Committee, Dublin principles for water as reflected in comparative assessment of institutional and legal arrangements for Integrated Water Resources

HEAD OF DEPARTMENT
 Department of Civil&Engg
JAI SHRIRAM ENGINEERING COLLEGE
 Nharapuram Road, Avinasipalayam,
 Tamilnadu.


REFERENCES

1. Singiresu S. Rao, "Mechanical Vibrations", Pearson Education Incorporated, 2017.
2. Graham Kelly. Sand Shashidhar K. Kudari, "Mechanical Vibrations", Tata McGraw – Hill Publishing Com. Ltd., 2007.
3. Ramamurti. V, "Mechanical Vibration Practice with Basic Theory", Narosa Publishing House, 2000.
4. William T. Thomson, "Theory of Vibration with Applications", Taylor & Francis, 2003.
5. G.K. Grover, "Mechanical Vibrations", Nem Chand and Bros., Roorkee, 2014.
6. A.G. Ambekar, "Mechanical Vibrations and Noise Engineering", PHI Learning Pvt. Ltd., 2014.
7. David A. Bies and Colin H. Hansen, "Engineering Noise Control – Theory and Practice", Spon Press, London and New York, 2009.

COURSE OUTCOMES

On completion of the course, the student is expected to be able to

- CO1: Apply the basic concepts of vibration in damped and undamped systems
- CO2: Apply the basic concepts of noise and to understand its effects on systems
- CO3: Select the instruments required for vibration measurement and its analysis
- CO4: Select the instruments required for noise measurement and its analysis.
- CO5: Recognize the noise sources and to control the vibration levels in a body and to control noise under different strategies.


HEAD OF DEPARTMENT
Department of Civil Engg
JAI SHRIRAM ENGINEERING COLLEGE
Dharapuram Road, Avinasipalayam,
Tirupur-638660. Tamilnadu.

| | | | | | |
|----------|---------------------------------|---|---|---|---|
| 24PCEO04 | ENVIRONMENTAL IMPACT ASSESSMENT | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

COURSE OBJECTIVES:

- To make the students to understand environmental clearance, its legal requirements and to provide knowledge on overall methodology of EIA, prediction tools and models, environmental management plan and case studies.

| | | |
|--|---------------------|----------|
| UNIT-I | INTRODUCTION | 9 |
| Historical development of Environmental Impact Assessment (EIA). Environmental Clearance- EIA in project cycle. legal and regulatory aspects in India – types and limitations of EIA –EIA process- screening – scoping - terms of reference in EIA- setting – analysis – mitigation. Cross sectoral issues –public hearing in EIA- EIA consultant accreditation. | | |

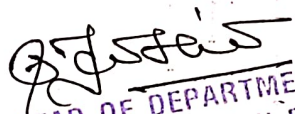
| | | |
|--|---|----------|
| UNIT-II | IMPACT IDENTIFICATION AND PREDICTION | 9 |
| Matrices – networks – checklists – cost benefit analysis – analysis of alternatives – expert systems in EIA. prediction tools for EIA – mathematical modeling for impact prediction – assessment of impacts – air – water – soil – noise – biological – cumulative impact assessment | | |

| | | |
|---|---|----------|
| UNIT-III | SOCIO-ECONOMIC IMPACT ASSESSMENT | 9 |
| Socio-economic impact assessment - relationship between social impacts and change in community and institutional arrangements. factors and methodologies- individual and family level impacts. communities in transition-rehabilitation | | |

| | | |
|---|--|----------|
| UNIT-IV | EIA DOCUMENTATION AND ENVIRONMENTAL MANAGEMENT PLAN | 9 |
| Environmental management plan - preparation, implementation and review – mitigation and rehabilitation plans – policy and guidelines for planning and monitoring programmes – post project audit – documentation of EIA findings – ethical and quality aspects of environmental impact assessment | | |

| | | |
|---|---------------------|----------|
| UNIT-V | CASE STUDIES | 9 |
| Mining, power plants, cement plants, highways, petroleum refining industry, storage & handling of hazardous chemicals, common hazardous waste facilities, CETPs, CMSWMF, building and construction projects | | |

| | | | |
|------|-------|-------|-------------------|
| L:45 | T: 00 | P: 00 | Total: 45 Periods |
|------|-------|-------|-------------------|


HEAD OF DEPARTMENT
 Department of Civil Engg
JAI SHRIRAM ENGINEERING COLLEGE
 Dharapuram Road, Avinashipalayam,
 Tirupur-635660, Tamilnadu.

Management, Technical Advisory Committee Background Paper No: 3. Global water partnership, Stockholm, Sweden. 1999.

5. Technical Advisory Committee, Effective Water Governance". Technical Advisory Committee Background Paper No: 7. Global water partnership, Stockholm, Sweden, 2003.

COURSE OUTCOMES

On completion of the course, the student is expected to be able to


CO1: Describe the context and principles of IWRM; Compare the conventional and integrated ways of water management.

CO2: Select the best economic option among the alternatives; illustrate the pros and cons of PPP through case studies.

CO3: Apply law and governance in the context of IWRM.

CO4: Discuss the linkages between water-health; develop a HIA framework.

CO5: Analyse how the virtual water concept pave way to alternate policy options.


HEAD OF DEPARTMENT
Department of Civil Engg
JAI SHRIRAM ENGINEERING COLLEGE
Dharapuram Road, Avinasipalayam,
Tirupur-638660, Tamilnadu.

| | | | | | |
|----------|-----------------------|---|---|---|---|
| 24PECO01 | IOT FOR SMART SYSTEMS | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

COURSE OBJECTIVES:

- To study about Internet of Things technologies and its role in real time applications.
- To introduce the infrastructure required for IoT
- To familiarize the accessories and communication techniques for IoT.
- To provide insight about the embedded processor and sensors required for IoT
- To familiarize the different platforms and Attributes for IoT

| | | |
|--|---|----------|
| UNIT-I | INTRODUCTION TO INTERNET OF THINGS | 9 |
| Overview, Hardware and software requirements for IOT, Sensor and actuators, Technology drivers, Business drivers, Typical IoT applications, Trends and implications. | | |

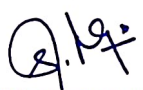
| | | |
|--|-------------------------|----------|
| UNIT-II | IOT ARCHITECTURE | 9 |
| IoT reference model and architecture -Node Structure - Sensing, Processing, Communication, Powering, Networking - Topologies, Layer/Stack architecture, IoT standards, Cloud computing for IoT, Bluetooth, Bluetooth Low Energy beacons. | | |

| | | |
|--|--|----------|
| UNIT-III | PROTOCOLS AND WIRELESS TECHNOLOGIES FOR IOT PROTOCOLS | 9 |
| NFC, SCADA and RFID, Zigbee MIPI, M-PHY, UniPro, SPMI, SPI, M-PCIe GSM, CDMA, LTE, GPRS, small cell. Wireless technologies for IoT: WiFi (IEEE 802.11), Bluetooth/Bluetooth Smart, ZigBee/ZigBee Smart, UWB (IEEE 802.15.4), 6LoWPAN, Proprietary systems-Recent trends. | | |

| | | |
|---|-----------------------|----------|
| UNIT-IV | IOT PROCESSORS | 9 |
| Services/Attributes: Big-Data Analytics for IOT, Dependability, Interoperability, Security, Maintainability. Embedded processors for IOT: Introduction to Python programming - Building IOT with RASPERRY PI and Arduino. | | |

| | | |
|--|---------------------|----------|
| UNIT-V | CASE STUDIES | 9 |
| Industrial IoT, Home Automation, smart cities, Smart Grid, connected vehicles, electric vehicle charging, Environment, Agriculture, Productivity Applications, IOT Defense | | |

| | | | |
|-------------|------------|------------|----------------------|
| L:45 | T:0 | P:0 | T: 45 PERIODS |
|-------------|------------|------------|----------------------|


HEAD OF THE DEPARTMENT
 Department of ECE
 Jai Shriram Engineering College
 Avinashipalayam, Tirupur-638660.

REFERENCES

1. ArshdeepBahga and VijaiMadiseti : A Hands-on Approach "Internet of Things",Universities Press 2015.
2. Oliver Hersent , David Boswarthick and Omar Elloumi " The Internet of Things", Wiley,2016.
3. Samuel Greengard, " The Internet of Things", The MIT press, 2015.
4. Adrian McEwen and Hakim Cassimally"Designing the Internet of Things "Wiley,2014.
5. Jean- Philippe Vasseur, Adam Dunkels, "Interconnecting Smart Objects with IP: The Next Internet" Morgan Kuffmann Publishers, 2010.
6. Adrian McEwen and Hakim Cassimally, "Designing the Internet of Things", John Wiley and sons, 2014.
7. Lingyang Song/DusitNiyato/ Zhu Han/ Ekram Hossain," Wireless Device-to-Device Communications and Networks, CAMBRIDGE UNIVERSITY PRESS,2015.
8. OvidiuVermesan and Peter Friess (Editors), "Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems", River Publishers Series in Communication, 2013.
9. Vijay Madiseti , ArshdeepBahga, "Internet of Things (A Hands on-Approach)", 2014.
10. Zach Shelby, Carsten Bormann, "6LoWPAN: The Wireless Embedded Internet", John Wiley and sons, 2009.
11. Lars T.Berger and Krzysztof Iniewski, "Smart Grid applications, communications and security", Wiley, 2015.
12. JanakaEkanayake, KithsiriLiyanage, Jianzhong Wu, Akihiko Yokoyama and Nick Jenkins, " Smart Grid Technology and Applications", Wiley, 2015.
13. UpenaDalal,"Wireless Communications & Networks,Oxford,2015.

COURSE OUTCOMES

At the end of the course students should be able to

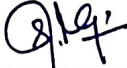
CO1: Analyze the concepts of IoT and its present developments.

CO2: Compare and contrast different platforms and infrastructures available for IoT

CO3: Explain different protocols and communication technologies used in IoT

CO4: Analyze the big data analytic and programming of IoT

CO5: Implement IoT solutions for smart applications


HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashipalayam, Tirupur-638660.

| | | | | | |
|----------|------------------------------|---|---|---|---|
| 24PCSO02 | INTERNET OF THINGS AND CLOUD | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

| |
|--|
| COURSE OBJECTIVES |
| <ul style="list-style-type: none"> To understand Smart Objects and IoT Architectures To learn about various IOT-related protocols To build simple IoT Systems using Arduino and Raspberry Pi. To understand data analytics and cloud in the context of IoT To develop IoT infrastructure for popular applications |

| | | |
|--|----------------------------|----------|
| UNIT-I | FUNDAMENTALS OF IoT | 9 |
| Introduction to IoT – IoT definition – Characteristics – IoT Complete Architectural Stack – IoT enabling Technologies – IoT Challenges. Sensors and Hardware for IoT – Hardware Platforms – Arduino, Raspberry Pi, Node MCU. A Case study with any one of the boards and data acquisition from sensors | | |

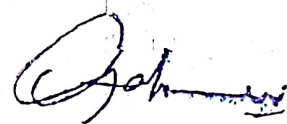
| | | |
|---|--------------------------|----------|
| UNIT-II | PROTOCOLS FOR IoT | 9 |
| Infrastructure protocol (IPV4/V6/RPL), Identification (URIs), Transport (Wifi, Lifi, BLE), Discovery, Data Protocols, Device Management Protocols. – A Case Study with MQTT/CoAP usage-IoT privacy, security and vulnerability solutions. | | |

| | | |
|---|---|----------|
| UNIT-III | CASE STUDIES/INDUSTRIAL APPLICATIONS | 9 |
| Case studies with architectural analysis: IoT applications – Smart City – Smart Water – Smart Agriculture – Smart Energy – Smart Healthcare – Smart Transportation – Smart Retail – Smart waste management. | | |

| | | |
|--|-------------------------------------|----------|
| UNIT-IV | CLOUD COMPUTING INTRODUCTION | 9 |
| Introduction to Cloud Computing - Service Model – Deployment Model- Virtualization Concepts – Cloud Platforms – Amazon AWS – Microsoft Azure – Google APIs | | |

| | | |
|---|----------------------|----------|
| UNIT-V | IoT AND CLOUD | 9 |
| IoT and the Cloud - Role of Cloud Computing in IoT - AWS Components - S3 – Lambda - AWS IoT Core -Connecting a web application to AWS IoT using MQTT- AWS IoT Examples. Security Concerns, Risk Issues, and Legal Aspects of Cloud Computing- Cloud Data Security | | |

| | | | |
|------|-----|-----|-------------------|
| L:45 | T:0 | P:0 | Total: 45 PERIODS |
|------|-----|-----|-------------------|



Prof. A. GOKILAVANI, B.Tech., M.E.,
 Head of the Department
 Computer Science and Engineering
 Jai Shriram Engineering College
 Avinashipalayam, Tirupur - 638 660.

REFERENCES

1. "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", by Pethuru Raj and Anupama C. Raman ,CRC Press, 2017
2. Adrian McEwen, Designing the Internet of Things, Wiley,2013.
3. EMC Education Services, "Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data", Wiley publishers, 2015.
4. Simon Walkowiak, "Big Data Analytics with R" PackT Publishers, 2016
5. Bart Baesens, "Analytics in a Big Data World: The Essential Guide to Data Science and its Applications", Wiley Publishers, 2015.

COURSE OUTCOMES

Upon completion of the course, the students will be able to

- CO1: Understand the various concept of the IoT and their technologies
- CO2: Develop IoT application using different hardware platforms
- CO3: Implement the various IoT Protocols
- CO4: Understand the basic principles of cloud computing.
- CO5: Develop and deploy the IoT application into cloud environment



Prof. A. GOKILAVANI, B.Tech., M.E.,
Head of the Department
Computer Science and Engineering
Jai Shriram Engineering College
Avinashipalayam, Tirupur - 638 660.

| | | | | | |
|----------|------------------------------------|---|---|---|---|
| 24PCSO03 | MACHINE LEARNING AND DEEP LEARNING | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

COURSE OBJECTIVES

- Understanding about the learning problem and algorithms
- Providing insight about neural networks
- Introducing the machine learning fundamentals and significance
- Enabling the students to acquire knowledge about pattern recognition.
- Motivating the students to apply deep learning algorithms for solving real life problems

| | | |
|---------------|---|----------|
| UNIT-I | LEARNING PROBLEMS AND ALGORITHMS | 9 |
|---------------|---|----------|

Various paradigms of learning problems, Supervised, Semi-supervised and Unsupervised algorithms

| | | |
|----------------|------------------------|----------|
| UNIT-II | NEURAL NETWORKS | 9 |
|----------------|------------------------|----------|

Differences between Biological and Artificial Neural Networks - Typical Architecture, Common Activation Functions, Multi-layer neural network, Linear Separability, Hebb Net, Perceptron, Adaline, Standard Back propagation Training Algorithms for Pattern Association - Hebb rule and Delta rule, Hetero associative, Auto associative, Kohonen Self Organising Maps, Examples of Feature Maps, Learning Vector Quantization, Gradient descent, Boltzmann Machine Learning.

| | | |
|-----------------|---|----------|
| UNIT-III | MACHINE LEARNING – FUNDAMENTALS & FEATURE SELECTIONS & CLASSIFICATIONS | 9 |
|-----------------|---|----------|

Classifying Samples: The confusion matrix, Accuracy, Precision, Recall, F1- Score, the curse of dimensionality, training, testing, validation, cross validation, overfitting, under-fitting the data, early stopping, regularization, bias and variance. Feature Selection, normalization, dimensionality reduction, Classifiers: KNN, SVM, Decision trees, Naïve Bayes, Binary classification, multi class classification, clustering.

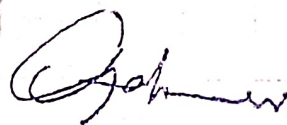
| | | |
|----------------|---|----------|
| UNIT-IV | DEEP LEARNING: CONVOLUTIONAL NEURAL NETWORKS | 9 |
|----------------|---|----------|

Feed forward networks, Activation functions, back propagation in CNN, optimizers, batch normalization, convolution layers, pooling layers, fully connected layers, dropout, Examples of CNNs.

| | | |
|---------------|---|----------|
| UNIT-V | DEEP LEARNING: RNNs, AUTOENCODERS AND GANS | 9 |
|---------------|---|----------|

State, Structure of RNN Cell, LSTM and GRU, Time distributed layers, Generating Text, Autoencoders: Convolutional Autoencoders, Denoising autoencoders, Variational autoencoders, GANs: The discriminator, generator, DCGANs

| | | | |
|------|-----|-----|-------------------|
| L:45 | T:0 | P:0 | Total: 45 PERIODS |
|------|-----|-----|-------------------|



Prof. A. GOKILAVANI, B.Tech., M.E.,
 Head of the Department
 Computer Science and Engineering
 Jai Shriram Engineering College
 Avinashpalayam, Tirupur - 638 660.

REFERENCES

1. J. S. R. Jang, C. T. Sun, E. Mizutani, Neuro Fuzzy and Soft Computing - A Computational Approach to Learning and Machine Intelligence, 2012, PHI learning
2. Deep Learning, Ian Good fellow, YoshuaBengio and Aaron Courville, MIT Press, ISBN: 9780262035613, 2016.
3. The Elements of Statistical Learning. Trevor Hastie, Robert Tibshirani and Jerome Friedman. Second Edition. 2009.
4. Pattern Recognition and Machine Learning. Christopher Bishop. Springer. 2006.
5. Understanding Machine Learning. Shai Shalev-Shwartz and Shai Ben-David. Cambridge University Press. 2017.

COURSE OUTCOMES

At the end of the course the student will be able to

CO1: Illustrate the categorization of machine learning algorithms.

CO2: Compare and contrast the types of neural network architectures, activation functions

CO3: Acquaint with the pattern association using neural networks

CO4: Elaborate various terminologies related with pattern recognition and architectures of convolutional neural networks

CO5: Construct different feature selection and classification techniques and advanced neural network architectures such as RNN, Autoencoders, and GANs.



Prof. A. GOKILAVANI, B.Tech., M.E.,
Head of the Department
Computer Science and Engineering
Jai Shriram Engineering College
Avinashipalayam, Tirupur - 638 660.

| | | | | | |
|-----------|-----------------------------|---|---|---|---|
| 24UPEEO01 | ELECTRIC VEHICLE TECHNOLOGY | L | T | P | C |
| | | 3 | 1 | 0 | 3 |

COURSE OBJECTIVES

- To learn the structure of Electric Vehicle, Hybrid Electric Vehicle
- To study about the EV conversion components
- To know about the details and specifications for Electric Vehicles
- To understand the concepts of Plug-in Hybrid Electric Vehicle
- To model and simulate all types of DC motors

| | | |
|--|---------------------------------|---|
| UNIT-I | VEHICLE ARCHITECTURE AND SIZING | 9 |
| Electric Vehicle History and Evolution of Electric Vehicles. Series, Parallel and Series parallel Architecture, Micro and Mild architectures. Mountain Bike - Motorcycle - Electric Cars and Heavy Duty EVs. - Details and Specifications. | | |

| | | |
|--|-------------------|---|
| UNIT-II | VEHICLE MECHANICS | 9 |
| Vehicle mechanics- Roadway fundamentals, Laws of motion, Vehicle Kinetics, Dynamics of vehicle motion, propulsion power, velocity and acceleration, Tire-Road mechanics; Propulsion System Design. | | |

| | | |
|---|-----------------------------|---|
| UNIT-III | POWER COMPONENTS AND BRAKES | 9 |
| Power train Component sizing- Gears, Clutches, Differential, Transmission and Vehicle Brakes. EV power train sizing, HEV Power train sizing, Example. | | |

| | | |
|---|---------------------------------|---|
| UNIT-IV | HYBRID VEHICLE CONTROL STRATEGY | 9 |
| Vehicle supervisory control, Mode selection strategy, Model Control strategies. | | |

| | | |
|--|---------------------------------|---|
| UNIT-V | PLUG-IN HYBRID ELECTRIC VEHICLE | 9 |
| Introduction-History - Comparison with electrical and hybrid electrical vehicle - Construction and working of PHEV-Block diagram and components-Charging mechanisms - Advantages of PHEVs. | | |

| | | | |
|-------|-------|-------|-------------------|
| L: 45 | T: 00 | P: 00 | Total: 45 Periods |
|-------|-------|-------|-------------------|

TEXT BOOKS

1. Mehrdad Ehsani, Yimin Gao, Sebastian E. Gay, Ali Emadi, 'Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design', CRC Press, 2004.
2. Build Your Own Electric Vehicle, Seth Leitman, Bob Brant, McGraw Hill, Third Edition 2013.

N. Lakshmi Priya

Dr. N. LAKSHMIPRIYA
 Head of the Department
 Electrical & Electronics Engineering
 Jal Shriram Engineering College
 Avinashpalayam, Tirupur-638660.

REFERENCES

1. Advanced Electric Drive Vehicles, Ali Emadi, CRC Press, First edition 2017.
2. The Electric Vehicle Conversion Handbook: How to Convert Cars, Trucks, Motorcycles, and Bicycles -Includes EV Components, Kits, and Project Vehicles Mark Warner, HP Books, 2011.
3. Heavy-duty Electric Vehicles from Concept to Reality, Shashank Arora, Alireza Tashakori Abkenar, Shantha Gamini Jayasinghe, Kari Tammi, Elsevier Science, 2021

COURSE OUTCOMES

At the end of the course, the students will be able to:

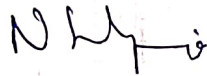
CO1: Summarize the History and Evolution of EVs, Hybrid and Plug-In Hybrid EVs.

CO2: Describe the various EV components.

CO3: Explain the power train components such as gears, clutches, differential, transmission, and braking systems used in EVs.

CO4: Infer the hybrid vehicle control strategy.

CO5: Explain the concepts related in the Plug-In Hybrid Electric Vehicles.



Dr. N.LAKSHMIPRIYA
Head of the Department

Electrical & Electronics Engineering
Jai Shriram Engineering College
Avinashpalayam, Tirupur-638660.

Dr. N.LAKSHMIPRIYA
Head of the Department
Electrical & Electronics Engineering
Jai Shriram Engineering College
Avinashpalayam, Tirupur-638660.

| | | | | | |
|-----------|-------------------------------|---|---|---|---|
| 24UPEEO02 | RENEWABLE ENERGY TECHNOLOGIES | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

COURSE OBJECTIVES

- To know the Indian and global energy scenario.
- To learn the various solar energy technologies and its applications.
- To educate the various wind energy technologies.
- To explore the various bio-energy technologies.
- To study the ocean and geothermal technologies.

| | | |
|---|-----------------|---|
| UNIT-I | ENERGY SCENARIO | 9 |
| Indian energy scenario in various sectors - domestic, industrial, commercial, agriculture, transportation and others - Present conventional energy status - Present renewable energy status - Potential of various renewable energy sources - Global energy status - Per capita energy consumption - Future energy plans. | | |

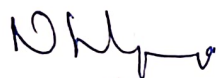
| | | |
|---|--------------|---|
| UNIT-II | SOLAR ENERGY | 9 |
| Solar radiation - Measurements of solar radiation and sunshine - Solar spectrum - Solar thermal collectors - Flat plate and concentrating collectors - Solar thermal applications - Solar thermal energy storage - Fundamentals of solar photo voltaic conversion - Solar cells - Solar PV Systems - Solar PV applications. | | |

| | | |
|--|-------------|---|
| UNIT-III | WIND ENERGY | 9 |
| Wind data and energy estimation - Betz limit - Site selection for wind farms - characteristics - Wind resource assessment - Horizontal axis wind turbine - components - Vertical axis wind turbine - Wind turbine generators and its performance - Hybrid systems - Environmental issues - Applications. | | |

| | | |
|--|------------|---|
| UNIT-IV | BIO-ENERGY | 9 |
| Bio resources - Biomass direct combustion - thermochemical conversion - biochemical conversion-mechanical conversion - Biomass gasifier - Types of biomass gasifiers Cogeneration- Carbonisation - Pyrolysis - Biogas plants - Digesters - Biodiesel production - Ethanol production - Applications. | | |

| | | |
|---|-----------------------------|---|
| UNIT-V | OCEAN AND GEOTHERMAL ENERGY | 9 |
| Small hydro - Tidal energy -Wave energy - Open and closed OTEC Cycles - Limitations - Geothermal energy - Geothermal energy sources - Types of geothermal power plants - Applications - Environmental impact. | | |

| | | | |
|-------|-------|-------|-------------------|
| L: 45 | T: 00 | P: 00 | Total: 45 Periods |
|-------|-------|-------|-------------------|



Dr. N. LAKSHMIPRIYA
 Head of the Department
 Electrical & Electronics Engineering
 Jai Shriram Engineering College
 Avinashpalayam, Tirupur-638660.

TEXT BOOKS

1. Fundamentals and Applications of Renewable Energy, Indian Edition, by Mehmet Kanoglu, Yunus A. Cengel, John M. Cimbala, cGraw Hill; First edition (10 December 2020), ISBN-10 : 9390385636.
2. Renewable Energy Sources and Emerging Technologies, by Kothari, Prentice Hall India Learning Private Limited; 2nd edition (1 January 2011), ISBN-10 : 8120344707.

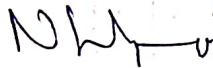
REFERENCES

1. Godfrey Boyle, "Renewable Energy, Power for a Sustainable Future", Oxford University Press, U.K., 2012.
2. Rai.G.D., "Non-Conventional Energy Sources", Khanna Publishers, New Delhi, 2014.
3. Sukhatme.S.P., "Solar Energy: Principles of Thermal Collection and Storage", Tata McGraw Hill Publishing Company Ltd., New Delhi, 2009.
4. Tiwari G.N., "Solar Energy – Fundamentals Design, Modelling and applications", Alpha Science Intl Ltd, 2015.
5. Twidell, J.W. & Weir A., "Renewable Energy Resources", EFNSpon Ltd., UK, 2015.

COURSE OUTCOMES

At the end of the course, the students will be able to:

- CO1: Discuss the Indian and global energy scenario.
CO2: Describe the various solar energy technologies and its applications.
CO3: Elucidate the various wind energy technologies.
CO4: Explore the various bio-energy technologies.
CO5: Outline the ocean and geothermal technologies.



Dr. N.LAKSHMIPRIYA
Head of the Department
Electrical & Electronics Engineering
Jai Shriram Engineering College
Avinashpalayam, Tirupur-638660.

Dr. N.LAKSHMIPRIYA
Head of the Department
Electrical & Electronics Engineering
Jai Shriram Engineering College
Avinashpalayam, Tirupur-638660

| | | | | | |
|----------|------------------------------|---|---|---|---|
| 24PECO02 | BIOMEDICAL SIGNAL PROCESSING | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

COURSE OBJECTIVES:

- Describe the properties and suitable models of biomedical signals
- Introduce the basic signal processing techniques in analyzing biomedical signals
- Develop computational skills in filtering of biomedical signals
- Develop an understanding on ECG signal compression algorithms
- Develop an understanding on feature extraction of biomedical signals

| | | |
|---|---|----------|
| UNIT-I | INTRODUCTION TO BIOMEDICAL SIGNALS | 9 |
| Introduction to Biomedical Signals: The nature of Biomedical Signals, Examples of Biomedical Signals, Objectives and difficulties in Biomedical analysis. Electrocardiography: Basic electrocardiography, ECG lead systems, ECG signal characteristics. Signal Conversion :Simple signal conversion systems, Conversion requirements for biomedical signals, Signal conversion circuits | | |

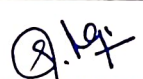
| | | |
|---|-------------------------|----------|
| UNIT-II | SIGNAL AVERAGING | 9 |
| Signal Averaging: Basics of signal averaging, signal averaging as a digital filter, a typical averager, software for signal averaging, limitations of signal averaging. Adaptive Noise Cancelling: Principal noise canceller model, 60-Hz adaptive cancelling using a sine wave model, other applications of adaptive filtering | | |

| | | |
|--|------------------------------------|----------|
| UNIT-III | DATA COMPRESSION TECHNIQUES | 9 |
| Data Compression Techniques: Turning point algorithm, AZTEC algorithm, Fan algorithm, Huffman coding, data reduction algorithms The Fourier transform, Correlation, Convolution, Power spectrum estimation, Frequency domain analysis of the ECG | | |

| | | |
|--|--|----------|
| UNIT-IV | CARDIOLOGICAL SIGNAL PROCESSING | 9 |
| Cardiological signal processing: Basic Electrocardiography, ECG data acquisition, ECG lead system, ECG signal characteristics (parameters and their estimation), Analog filters, ECG amplifier, and QRS detector, Power spectrum of the ECG, Bandpass filtering techniques, Differentiation techniques, Template matching techniques, A QRS detection algorithm, Realtime ECG processing algorithm, ECG interpretation, ST segment analyzer, Portable arrhythmia monitor | | |

| | | |
|---|---------------------------------------|----------|
| UNIT-V | NEUROLOGICAL SIGNAL PROCESSING | 9 |
| Neurological signal processing: The brain and its potentials, The electrophysiological origin of brain waves, The EEG signal and its characteristics (EEG rhythms, waves, and transients), Correlation. Analysis of EEG channels: Detection of EEG rhythms, Template matching for EEG, spike and wave detection | | |

| | | | |
|------|-----|-----|---------------|
| L:45 | T:0 | P:0 | T: 45 PERIODS |
|------|-----|-----|---------------|


 HEAD OF THE DEPARTMENT
 Department of ECE
 Jai Shriram Engineering College
 Avinashpalayam, Tirupur-638660.

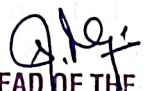
REFERENCES

1. Rangaraj M Rangayyan "Biomedical Signal Analysis – A case study approach" IEEE press series in biomedical engineering, First Edition, 2002
2. John G Proakis, Dimitris and G. Manolakis, "Digital Signal Processing Principles algorithms, applications" PHI Third Edition. 2006
3. Willis J. Tompkins " Biomedical Digital Signal Processing", EEE, PHI, 2004
4. D C Reddy "Biomedical Signal Processing: Principles and Techniques", Tata McGraw-Hill Publishing Co. Ltd, 2005
5. J G Webster "Medical Instrumentation: Application & Design", John Wiley & Sons Inc., 2001

COURSE OUTCOMES

At the end of the course students should be able to

- CO1: Possess skills necessary to analyze ECG and EEG Signals
- CO2: Apply classical and modern filtering techniques for ECG and EEG Signals
- CO3: Apply classical and modern compression techniques for ECG and EEG Signals
- CO4: Develop an understanding on ECG feature extraction
- CO5: Develop an understanding on EEG feature extraction


HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashipalayam, Tirupur-638660.

| | | | | | |
|----------|-----------------|----------|----------|----------|----------|
| 24PECO03 | ROBOTICS | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

COURSE OBJECTIVES:

- To Introduce the concepts of Robotic systems
- To understand the concepts of Instrumentation and control related to Robotics
- To understand the kinematics and dynamics of robotics
- To explore robotics in Industrial applications

| | | |
|--|---------------------------------|----------|
| UNIT-I | INTRODUCTION TO ROBOTICS | 9 |
| Robotics -History - Classification and Structure of Robotic Systems - Basic components - Degrees of freedom - Robot joints coordinates- Reference frames - workspace- Robot languages- Robotic sensors- proximity and range sensors, ultrasonic sensor, touch and slip sensor. | | |

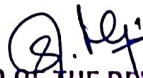
| | | |
|--|--------------------------------------|----------|
| UNIT-II | ROBOT KINEMATICS AND DYNAMICS | 9 |
| Kinematic Modelling: Translation and Rotation Representation, Coordinate transformation, DH parameters, Forward and inverse kinematics, Jacobian, Dynamic Modelling: Forward and inverse dynamics, Equations of motion using Euler-Lagrange formulation, Newton Euler formulation. | | |

| | | |
|---|-------------------------|----------|
| UNIT-III | ROBOTICS CONTROL | 9 |
| Control of robot manipulator - state equations - constant solutions -linear feedback systems, singleaxis PID control - PD gravity control -computed torque control, variable structure control and impedance control. | | |

| | | |
|--|---|----------|
| UNIT-IV | ROBOT INTELLIGENCE AND TASK PLANNING | 9 |
| Artificial Intelligence - techniques - search problem reduction - predicate logic means and end analysis -problem solving -robot learning - task planning - basic problems in task planning - AI in robotics and Knowledge Based Expert System in robotics | | |

| | | |
|--|----------------------------|----------|
| UNIT-V | INDUSTRIAL ROBOTICS | 9 |
| Robot cell design and control - cell layouts - multiple robots and machine interference - work cell design - work cell control - interlocks – error detection deduction and recovery - work cell controller - robot cycle time analysis. Safety in robotics, Applications of robot and future scope. | | |

| | | | |
|-------------|------------|------------|----------------------|
| L:45 | T:0 | P:0 | T: 45 PERIODS |
|-------------|------------|------------|----------------------|


 HEAD OF THE DEPARTMENT
 Department of ECE
 Jai Shriram Engineering College
 Avinashipalayam, Tirupur-638660.

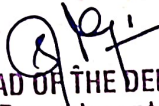
REFERENCES

1. John J. Craig, 'Introduction to Robotics (Mechanics and Control)', Addison-Wesley, 2nd Edition, 2004.
2. Richard D. Klafter, Thomas A. Chmielewski, Michael Negin, 'Robotics Engineering: An Integrated Approach', PHI Learning, New Delhi, 2009.
3. K.S.Fu, R.C.Gonzalez and C.S.G.Lee, 'Robotics Control, Sensing, Vision and Intelligence', Tata McGraw Hill, 2nd Reprint, 2008.
4. Reza N.Jazar, 'Theory of Applied Robotics Kinematics, Dynamics and Control', Springer, 1st Indian Reprint, 2010.
5. Mikell. P. Groover, Michell Weis, Roger. N. Nagel, Nicolous G.Odrey, 'Industrial Robotics Technology, Programming and Applications', McGraw Hill, Int 2012.

COURSE OUTCOMES

At the end of the course students should be able to

- CO1: Describe the fundamentals of robotics
- CO2: Understand the concept of kinematics and dynamics in robotics.
- CO3: Discuss the robot control techniques
- CO4: Explain the basis of intelligence in robotics and task planning
- CO5: Discuss the industrial applications of robotics


HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashipalayam, Tirupur-638660.

| | | | | | |
|----------|------------------------|---|---|---|---|
| 24PMBO01 | SUSTAINABLE MANAGEMENT | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

| |
|-----------------------|
| Prerequisites: |
| Nil |

| |
|---|
| COURSE OBJECTIVES: |
| <ul style="list-style-type: none"> To provide students with fundamental knowledge of the notion of corporate sustainability. To determine how organizations impacts on the environment and socio-technical systems, the relationship between social and environmental performance and competitiveness, the approaches and methods. To learn about sustainable development goals for modern business. |

| | | |
|---|-------------------------------------|----------|
| UNIT-I | MANAGEMENT OF SUSTAINABILITY | 9 |
| Management of sustainability -rationale and political trends: An introduction to sustainability management, International and European policies on sustainable development, theoretical pillars in sustainability management studies. | | |

| | | |
|---|--|----------|
| UNIT-II | CORPORATE SUSTAINABILITY AND RESPONSIBILITY | 9 |
| Corporate sustainability parameter, corporate sustainability institutional framework, integration of sustainability into strategic planning and regular business practices, fundamentals of stakeholder engagement. | | |

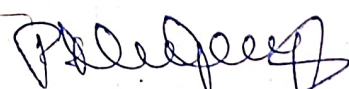
| | | |
|--|---|----------|
| UNIT-III | SUSTAINABILITY MANAGEMENT: STRATEGIES AND APPROACHES | 9 |
| Corporate sustainability management and competitiveness: Sustainability-oriented corporate strategies, markets and competitiveness, Green Management between theory and practice, Sustainable Consumption and Green Marketing strategies, Environmental regulation and strategic postures; Green Management approaches and tools; Green engineering: clean technologies and innovation processes; Sustainable Supply Chain Management and Procurement. | | |

| | | |
|--|--------------------------------------|----------|
| UNIT-IV | SUSTAINABILITY AND INNOVATION | 9 |
| Socio-technical transitions and sustainability, Sustainable entrepreneurship, Sustainable pioneers in green market niches, Smart communities and smart specializations. Climate resilience, sustainable supply chains, and the integration of environmental, social, and governance (ESG) practices. Sustainable Development Goals (SDGs). | | |

| | | |
|---|---|----------|
| UNIT-V | SUSTAINABLE MANAGEMENT OF RESOURCES, COMMODITIES AND COMMONS | 9 |
| Energy management, Water management, Waste management, Wild Life Conservation, Emerging trends in sustainable management, Case Studies. | | |

| | | | |
|------|-------|------|-------------------|
| L:45 | T: 00 | P:00 | Total :45 Periods |
|------|-------|------|-------------------|

88



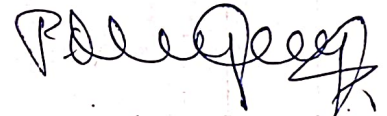
Dr. P.MEGALADEVI MBA, M.Com., Ph.D.,
 DEAN - School of Management Studies
 Jai Shriram Engineering College
 Dharapuram Road, Avinashpalayam,
 Tirupur-638 660. Tamil Nadu, India.

REFERENCES

1. Daddi, T., Iraldo, F., Testa, Environmental Certification for Organizations and Products: Management, 2015
2. Christian N. Madu, Handbook of Sustainability Management 2012
3. Petra Molthan-Hill, The Business Student's Guide to Sustainable Management: Principles and Practice, 2014
4. Margaret Robertson, Sustainability Principles and Practice, 2014
5. Peter Rogers, An Introduction to Sustainable Development, 2006

COURSE OUTCOMES

- CO1: An understanding of sustainability management as an approach to aid in evaluating and minimizing environmental impacts while achieving the expected social impact.
- CO2: An understanding of corporate sustainability and responsible Business Practices
- CO3: Knowledge and skills to understand, to measure and interpret sustainability performances.
- CO4: Knowledge of innovative practices in sustainable business and community management
- CO5: Deep understanding of sustainable management of resources and commodities



Dr. P. MEGALADEVI MBA., M.Com., Ph.D.,
DEAN - School of Management Studies
Jai Shriram Engineering College
Dharapuram Road, Avinashipalayam,
Tirupur-638 660. Tamil Nadu, India.

| | | | | | |
|----------|--|---|---|---|---|
| 24PMBO02 | MICRO AND SMALL BUSINESS MANAGEMENT | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

| |
|-----------------------|
| Prerequisites: |
| Nil |

| |
|--|
| COURSE OBJECTIVES: |
| <ul style="list-style-type: none"> To familiarize students with the theory and practice of small business management. To learn the legal issues faced by small business and how they impact operations. To learn modern finance functions and technology and innovations. |

| | | |
|---|---------------------------------------|----------|
| UNIT-I | INTRODUCTION TO SMALL BUSINESS | 9 |
| <p>Creation, Innovation, entrepreneurship and small business - Defining Small Business - Role of Owner - Manager - government policy towards small business sector - elements of entrepreneurship - evolution of entrepreneurship - Types of Entrepreneurship - social, civic, corporate - Business life cycle - barriers and triggers to new venture creation - process to assist start ups - small business and family business</p> | | |

| | | |
|---|---|----------|
| UNIT-II | SCREENING THE BUSINESS OPPORTUNITY AND FORMULATING THE BUSINESS PLAN | 9 |
| <p>Concepts of opportunity recognition; Key factors leading to new venture failure; New venture screening process; Applying new venture screening process to the early stage small firm Role planning in small business - importance of strategy formulation - management skills for small business creation and development.</p> | | |

| | | |
|--|---|----------|
| UNIT-III | BUILDING THE RIGHT TEAM AND MARKETING STRATEGY | 9 |
| <p>Management and Leadership - employee assessments - Tuckman's stages of group development- The entrepreneurial process model - Delegation and team building - Comparison of HR management in small and large firms - Importance of coaching and how to apply a coaching model. Marketing within the small business - success strategies for small business marketing - customer delight and business generating systems, - market research, - assessing market performance sales management and strategy - the marketing mix and</p> | | |

| | | |
|---|---------------------------------|----------|
| UNIT-IV | FINANCING SMALL BUSINESS | 9 |
| <p>Main sources of entrepreneurial capital; Nature of 'bootstrap' financing - Difference between cash and profit - Nature of bank financing and equity financing - Funding-equity gap for small firms. Importance of working capital cycle - Calculation of break-even point - Power of gross profit margin- Pricing for profit - Credit policy issues and relating these to cash flow management and profitability. Sustainable finance, circular economy, digitalization, and the evolving role of technology and innovation.</p> | | |

| | | |
|---|---|----------|
| UNIT-V | VALUING SMALL BUSINESS AND CRISIS MANAGEMENT | 9 |
| <p>Causes of small business failure - Danger signals of impending trouble - Characteristics of poorly performing firms - Turnaround strategies - Concept of business valuation - Different valuation measurements - Nature of goodwill and how to measure it - Advantages and disadvantages of buying an established small firm - Process of preparing a business for sale.</p> | | |

P. Megaladevi

Dr. P. MEGALADEVI MBA., M.Com., Ph.D.,
DEAN - School of Management Studies
Jai Shriram Engineering College
Dharapuram Road, Avinashpalayam,
Tirunelveli-628 660 Tamil Nadu, India.

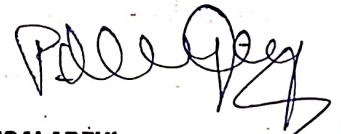
| | | | |
|------|-------|------|-------------------|
| L:45 | T: 00 | P:00 | Total :45 Periods |
|------|-------|------|-------------------|

REFERENCES

1. Hankinson,A.(2000). "The key factors in the profile of small firm owner-managers that influence business performance. The South Coast Small Firms Survey, 1997-2000." Industrial and Commercial Training 32(3):94-98.
2. Parker,R.(2000). "Small is not necessarily beautiful: An evaluation of policy support for small and medium-sized enterprise in Australia." Australian Journal of Political Science 35(2):239-253.
3. Journal articles on SME's.

COURSEOUTCOMES

- CO1. Familiarize the students with the concept of small business
- CO2. In depth knowledge on small business opportunities and challenges
- CO3. Ability to devise plans for small business by building the right skills and marketing strategies
- CO4. Identify the funding source for small start ups
- CO5. Business evaluation for buying and selling of small firms



Dr. P. MEGALADEVI MBA., M.Com., Ph.D.,
DEAN - School of Management Studies
Jai Shriram Engineering College
Dharapuram Road, Avinashipalayam,
Tirupur-638 660. Tamil Nadu, India.

| | | | | | |
|--------------|-------------------------|---|---|---|---|
| 24PME00 1 | NANOCOMPOSITE MATERIALS | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

| |
|-----------------------|
| Prerequisites: |
| Nil |

| |
|--|
| COURSE OBJECTIVES: |
| To introduce the fundamentals of nanocomposites, including their nomenclature, properties, processing, and characterization. |
| To study metal-based nanocomposites and understand their synthesis methods, structural features, and functional properties. |
| To explore polymer-based nanocomposites, focusing on preparation techniques, structure-property relationships, and potential applications. |

| | | |
|--|---------------------------------|----------|
| UNIT-I | BASICS OF NANOCOMPOSITES | 9 |
| Nomenclature, Properties, features and processing of nanocomposites. Sample Preparation and Characterization of Structure and Physical properties. Designing, stability and mechanical properties and applications of super hard nanocomposites. | | |

| | | |
|---|-----------------------------------|----------|
| UNIT-II | METAL BASED NANOCOMPOSITES | 9 |
| Metal-metal nanocomposites, some simple preparation techniques and their properties. Metal- Oxide or Metal-Ceramic composites, Different aspects of their preparation techniques and their final properties and functionality. Fractal based glass-metal nanocomposites, its designing and fractal dimension analysis. Core-Shell structured nanocomposites | | |

| | | |
|---|-------------------------------------|----------|
| UNIT-III | POLYMER BASED NANOCOMPOSITES | 9 |
| Preparation and characterization of diblock Copolymer based nanocomposites; Polymer Carbon nanotubes-based composites, their mechanical properties, and industrial possibilities. | | |

| | | |
|--|--|----------|
| UNIT-IV | NANOCOMPOSITE FROM BIOMATERIALS | 9 |
| Natural nanocomposite systems - spider silk, bones, shells; organic-inorganic nanocomposite formation through self-assembly. Biomimetic synthesis of nanocomposites material; Use of synthetic nanocomposites for bone, teeth replacement. | | |

| | | |
|---|---------------------------------|----------|
| UNIT-V | NANOCOMPOSITE TECHNOLOGY | 9 |
| Nanocomposite membrane structures- Preparation and applications. Nanotechnology in Textiles and Cosmetics-Nano-fillers embedded polypropylene fibers – Soil repellence, Lotus effect - Nano finishing in textiles (UV resistant, anti-bacterial, hydrophilic, self-cleaning, flame-retardant finishes), Sun-screen dispersions for UV protection using titanium oxide – Colour cosmetics. Nanotechnology in Food Technology - Nano packaging for enhanced shelf life - Smart/Intelligent packaging. | | |

Card

| | | | |
|----------|-----|-----|-------------------|
| L:4 5 | T:0 | P:0 | Total :45 Periods |
|----------|-----|-----|-------------------|

Head of the Department
 Department of Mechanical Engineering
Jai Shriram Engineering College
 Dharapuram Road, Avinashipalayam,
 Tirupur-638 660. Tamil Nadu, India.

TEXT BOOKS

1. Introduction to Nanocomposite Materials. Properties, Processing, Characterization- Thomas E. Twardowski. 2007. DEStech Publications. USA.
2. Nanocomposites Science and Technology - P. M. Ajayan, L.S. Schadler, P. V. Braun 2006.
3. Physical Properties of Carbon Nanotubes- R. Saito 1998.

REFERENCES

1. Carbon Nanotubes (Carbon , Vol 33) - M. Endo, S. Iijima, M.S. Dresselhaus 1997.
2. The search for novel, super hard materials- Stan Veprjek (Review Article) JVST A, 1999
3. Nanometer versus micrometer-sized particles-Christian Brosseau, Jamal BeN Youssef, Philippe Talbot, Anne-Marie Konn, (Review Article) J. Appl. Phys, Vol 93, 2003
4. Diblock Copolymer, - Aviram (Review Article), Nature, 2002
5. Bikramjit Basu, Kantesh Balani Advanced Structural Ceramics, A John Wiley & Sons, Inc., 9. P. Brown and K. Stevens, Nanofibers and Nanotechnology in Textiles, Woodhead publication, London, 2006

COURSE OUTCOMES:**At the end of the course the students would be able to**

Explain the nomenclature, properties, and fabrication methods of nanocomposites and analyse their structural and mechanical characteristics.

Assess and compare metal-based nanocomposites, including metal-metal, metal-oxide, and core-shell systems, with respect to their preparation techniques, functionalities, and fractal behaviour.

Develop and characterize polymer-based nanocomposites, such as diblock copolymers and CNT-polymer composites, and evaluate their mechanical and industrial relevance.

Describe natural biomaterial nanocomposites and apply biomimetic strategies for synthesizing organic-inorganic nanocomposite materials for biomedical applications.

Apply nanocomposite technology in membranes, textiles, cosmetics, and food packaging.



Head of the Department
Department of Mechanical Engineering
Jai Shriram Engineering College
Dharapuram Road, Avinashipalayam,
Tirupur-638 660. Tamil Nadu, India.

Head of the Department
Department of Mechanical Engineering
Jai Shriram Engineering College
Dharapuram Road, Avinashipalayam,
Tirupur-638 660. Tamil Nadu, India.

| | | | | | |
|--------------|------------------------|---|---|---|---|
| 24PME00 2 | ADDITIVE MANUFACTURING | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

Prerequisites:

Nil

COURSE OBJECTIVES:

- To introduce the principles, classifications, and major technologies of additive manufacturing.
- To understand material behaviour, consolidation mechanisms, and process, structure property relationships in AM.
- To develop skills in digital modelling, slicing, and process planning for efficient and high-quality 3D printing.

UNIT-I INTRODUCTION TO ADDITIVE MANUFACTURING

7

Introduction to layered manufacturing, Importance of Additive Manufacturing in Product Development, Classification of additive manufacturing processes, Common additive manufacturing technologies, Capabilities, materials, costs, advantages and limitations of different systems.

UNIT-II

MATERIALS AND MECHANISMS IN ADDITIVE MANUFACTURING

9

Material science for additive manufacturing-Mechanisms of material consolidation-FDM, SLS, SLM, 3D printing and jetting technologies. Polymers coalescence and sintering, photopolymerization, solidification rates, meso and macro structures, Process evaluation: process-structure relationships, structure property relationships, Applications: Prototyping, Industrial tooling, Aerospace, Automobile, Medical etc., Quality control and reliability: Defects in FDM, SLS and SLM, Critical process parameters: geometry, temperature, composition, phase transformation, Numerical and experimental evaluation: roles of process parameter combination, process optimization.

UNIT-III CAD AND SOFTWARE TOOLS FOR 3D PRINTING

9

CAD Modelling for 3D printing: 3D Scanning and digitization, data handling & reduction Methods, AM Software: data formats and standardization, Slicing algorithms: uniform flat layer slicing, adaptive slicing, Process-path generation: Process-path algorithms, rasterization, part Orientation and support generation.

UNIT-IV POWDER BED FUSION AND BINDER JETTING TECHNOLOGIES

10

Powder Bed Fusion: Selective Laser Sintering (SLS): Principles, Process, Indirect and Direct SLS – Powder Structure, Materials, Surface Deviation and Accuracy, Applications, Multi-jet Fusion Principles, Processes, Materials, Capabilities and Applications. Selective Laser Melting (SLM) and Electron Beam Melting (EBM): Principles, Processes, Materials, Limitations and Applications.
Binder Jetting: Three-Dimensional Printing (3DP): Principles, Process, Physics of 3DP, Materials Capabilities, Limitations and Applications.

Carthi

Head of the Department
Department of Mechanical Engineering
Jai Shriram Engineering College
Dharapuram Road, Avinashpalayam,
Tirupur-638 660. Tamil Nadu, India.

| | | |
|---|--|-----------|
| UNIT-V | DIRECT ENERGY DEPOSITION & HYBRID AM TECHNOLOGIES | 10 |
| Direct Energy Deposition: Laser Engineered Net Shaping (LENS): Processes, Materials, Capabilities Limitations and Applications. Ultrasonic Additive Manufacturing (UAM) Process, Parameters Capabilities, Applications. Case Studies. Hybrid Additive Manufacturing, Need, Principles, Part Quality and Process Efficiency. Wire Arc Additive Manufacturing (WAAM) Processes, Materials Capabilities, Limitations and Applications and Case Studies | | |

| | | | |
|------------|------------|------------|--------------------------|
| L:4 | T:0 | P:0 | Total :45 Periods |
| 5 | | | |

| |
|--|
| TEXT BOOKS |
| <ol style="list-style-type: none"> Gibson, I., Rosen, D.W. and Stucker, B., "Additive Manufacturing Methodologies: Rapid Prototyping to Direct Digital Manufacturing", Springer, 2015. Chua, C.K., Leong K.F. and Lim C.S., "Rapid prototyping: Principles and applications", Third edition, World Scientific Publishers, 2010. |
| REFERENCES |
| <ol style="list-style-type: none"> Liou, L.W. and Liou, F.W., "Rapid Prototyping and Engineering applications: A tool box for prototype development", CRC Press, 2011. Kamrani, A.K. and Nasr, E.A., "Rapid Prototyping: Theory and practice", Springer, 2006. Hilton, P.D. and Jacobs, P.F., Rapid Tooling: Technologies and Industrial Applications, CRC Press, 2000 Kruth, J.P., Froyen, L., et al., Selective Laser Sintering and Melting: Fundamentals and Applications. |
| COURSE OUTCOMES: |
| <p>At the end of the course the students would be able to</p> <ul style="list-style-type: none"> Explain the principles, classifications, and key technologies of additive manufacturing. Analyse material behaviour and consolidation mechanisms in various AM processes. Apply CAD modelling, data processing, slicing, and toolpath generation techniques for preparing digital models suitable for 3D printing. Evaluate Powder Bed Fusion, Binder Jetting, and Directed Energy Deposition processes with respect to their principles, materials, limitations, and industrial applications. Assess hybrid AM processes and advanced AM technologies and propose suitable process parameters and optimization strategies for improved part quality and reliability. |

Carth

Head of the Department
 Department of Mechanical Engineering
Jai Shriram Engineering College
 Dharapuram Road, Avinashpalayam,
 Tirupur-638 660. Tamil Nadu, India.

CONTROLLED COPY



JAI SHRIRAM ENGINEERING COLLEGE, TIRUPPUR – 638 660
(An Autonomous Institution)

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai
Recognized by UGC & Accredited by NAAC and NBA (CSE and ECE)

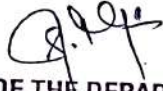


REGULATIONS 2024

M.E. APPLIED ELECTRONICS

CHOICE BASED CREDIT SYSTEM

SYLLABUS FOR AUDIT COURSES


HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashipalayam, Tirupur-638660.

| | | | | | |
|----------|------------------------------------|---|---|---|---|
| 24PAC001 | ENGLISH FOR RESEARCH PAPER WRITING | L | T | P | C |
| | | 2 | 0 | 0 | 0 |

COURSE OBJECTIVES:

- Teach how to improve writing skills and level of readability.
- Tell about what to write in each section.
- Summarize the skills needed when writing a Title.
- Infer the skills needed when writing the Conclusion.
- Ensure the quality of paper at very first-time submission.

| | | |
|---|---|----------|
| UNIT I | INTRODUCTION TO RESEARCH PAPER WRITING | 6 |
| Planning and Preparation, Word Order, breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness | | |


| | | |
|---|----------------------------|----------|
| UNIT II | PRESENTATION SKILLS | 6 |
| Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticizing, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts, Introduction | | |

| | | |
|---|-----------------------------|----------|
| UNIT III | TITLE WRITING SKILLS | 6 |
| Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check | | |

| | | |
|---|------------------------------|----------|
| UNIT IV | RESULT WRITING SKILLS | 6 |
| Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions | | |

| | | |
|---|----------------------------|----------|
| UNIT V | VERIFICATION SKILLS | 6 |
| Useful phrases, checking Plagiarism, how to ensure paper is as good as it could possibly be the first-time submission | | |

| | | | |
|-------------|------------|------------|----------------------|
| L:45 | T:0 | P:0 | T: 45 PERIODS |
|-------------|------------|------------|----------------------|


HEAD OF THE DEPARTMENT
 Dept. of Science & Humanities
 Jay Shriram Engineering College
 Dharapuram Road, Avinashipalayam,
 TIRUPUR -638 660, Tamilnadu.

| | | | | | |
|----------|---------------------|---|---|---|---|
| 24PAC002 | DISASTER MANAGEMENT | L | T | P | C |
| | | 2 | 0 | 0 | 0 |

COURSE OBJECTIVES:

- Summarize basics of disaster.
- Explain a critical understanding of key concepts in disaster risk reduction and humanitarian response.
- Illustrate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
- Describe an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
- Develop the strengths and weaknesses of disaster management approaches

| | | |
|---|---------------------|----------|
| UNIT I | INTRODUCTION | 6 |
| Disaster: Definition, Factors and Significance; Difference between Hazard and Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude. | | |

| | | |
|---|---|----------|
| UNIT II | REPERCUSSIONS OF DISASTERS AND HAZARDS | 6 |
| Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem, Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts and Famines, Landslides and Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks and Spills, Outbreaks Of Disease And Epidemics, War And Conflicts. | | |

| | | |
|--|--------------------------------------|----------|
| UNIT III | DISASTER PRONE AREAS IN INDIA | 6 |
| Study of Seismic Zones; Areas Prone To Floods and Droughts, Landslides and Avalanches; Areas Prone To Cyclonic and Coastal Hazards with Special Reference To Tsunami; Post-Disaster Diseases and Epidemics | | |

| | | |
|--|---|----------|
| UNIT IV | DISASTER PREPAREDNESS AND MANAGEMENT | 6 |
| Preparedness: Monitoring Of Phenomena Triggering a Disaster or Hazard; Evaluation of Risk: Application of Remote Sensing, Data from Meteorological And Other Agencies, Media Reports: Governmental and Community Preparedness. | | |

| | | |
|--|------------------------|----------|
| UNIT V | RISK ASSESSMENT | 6 |
| Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Co-Operation in Risk Assessment and Warning, People's Participation in Risk Assessment. Strategies for Survival | | |


HEAD OF THE DEPARTMENT
 Dept. of Science & Humanities,
 Jay Shriram Engineering College
 Dharapuram Road, Avinashipalayam,
 TIRUPUR -638 660, Tamilnadu.

| | | | |
|------|-----|-----|---------------|
| L:45 | T:0 | P:0 | T: 45 PERIODS |
|------|-----|-----|---------------|

REFERENCES

1. Goel S. L., Disaster Administration and Management Text And Case Studies", Deep& Deep Publication Pvt. Ltd., New Delhi,2009.
2. Nishitha Rai, Singh AK, "Disaster Management in India: Perspectives, issues and strategies ""NewRoyal book Company,2007.
3. Sahni, PardeepEt.Al. ," Disaster Mitigation Experiences and Reflections", Prentice Hall OfIndia, New Delhi,2001.

COURSE OUTCOMES

At the end of the course students should be able to

CO1: Ability to summarize basics of disaster.

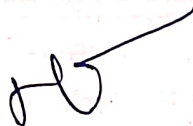
CO2: Ability to explain a critical understanding of key concepts in disaster risk reduction and

humanitarian response.

CO3: Ability to illustrate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.

CO4: Ability to describe an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.

CO5: Ability to develop the strengths and weaknesses of disaster management approaches



HEAD OF THE DEPARTMENT
Dept. of Science & Humanities,
Jay Shriram Engineering College
Dharapuram Road, Avinashpalayam,
TIRUPUR -638 660, Tamilnadu.

| | | | | | |
|----------|-----------------------|---|---|---|---|
| 24PAC003 | CONSTITUTION OF INDIA | L | T | P | C |
| | | 2 | 0 | 0 | 0 |

COURSE OBJECTIVES:

- Students will be able to:
- Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
 - To address the growth of Indian opinion regarding modern Indian intellectuals' Constitutional.
 - Role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
 - To address the role of socialism in India after the commencement of the Bolshevik.
 - Revolution 1917 And its impact on the initial drafting of the Indian Constitution.

| | | |
|--|---|----------|
| UNIT I | HISTORY OF MAKING OF THE INDIAN CONSTITUTION | 9 |
| History, Drafting Committee, (Composition & Working) | | |

| | | |
|----------------------------|--|----------|
| UNIT II | PHILOSOPHY OF THE INDIAN CONSTITUTION | 9 |
| Preamble, Salient Features | | |

| | | |
|--|---|----------|
| UNIT III | CONTOURS OF CONSTITUTIONAL RIGHTS AND DUTIES | 9 |
| Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties | | |

| | | |
|---|-----------------------------|----------|
| UNIT IV | ORGANS OF GOVERNANCE | 9 |
| Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions. | | |

| | | |
|--|-----------------------------|----------|
| UNIT V | LOCAL ADMINISTRATION | 9 |
| District's Administration head: Role and Importance, of Elected Representative, CEO, Municipal Corporation. Pachayati raj: Introduction, PRI: Zila Pachayat. Elected officials and their roles, CEO Zila Pachayat: Position and role. Block level: Organizational Hierarchy(Different departments), Village level: Role of Elected and Appointed officials Importance of grass root democracy. | | |

| | | |
|--|----------------------------|----------|
| UNIT VI | ELECTION COMMISSION | 9 |
| Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners - Institute and Bodies for the welfare of SC/ST/OBC and women. | | |

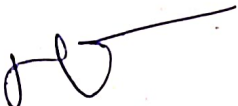
REFERENCES

1. Allan Bonnick, "Automotive Computer Controlled Systems", Butterworth-Heinemann, Elsevier, 1st Edition, 2011. (Unit I)
2. Eric C. Howanietz, "Automobile Electronics" by SAE Publications, 1995. (Unit II)
3. Tom Weather Jr and Cland C. Hunter, "Automotive Computers and Control System" Prentice-Hall Inc., 1984 New Jersey. (Unit II, III)
4. R.K. Jurgen, "Automotive Electronics Handbook", McGraw Hill 2nd Edition, 1995. (Unit IV, V)
5. William B Ribbens, "Understanding Automotive Electronics", 5th edition - Butterworth-Heinemann Woburn, 1998. (Unit V)

COURSE OUTCOMES

At the end of the course students should be able to

- CO1: Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
- CO2: Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
- CO3: Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
- CO4: Discuss the passage of the Hindu Code Bill of 1956


HEAD OF THE DEPARTMENT
Dept. of Science & Humanities,
Jay Shriram Engineering College
Dharapuram Road, Avinashpalayam,
TIRUPUR - 638 660, Tamilnadu.


| | | | | | |
|----------|--------------------|---|---|---|---|
| 24PAC004 | நற்றமிழ் இலக்கியம் | L | T | P | C |
| | | 2 | 0 | 0 | 0 |

| | | |
|---|---------------|---|
| UNIT I | சங்கஇலக்கியம் | 6 |
| 1. தமிழின் துவக்க நூல் தொல்காப்பியம் - எழுத்து, சொல், பொருள் 2. அகநானூறு (82) -இயற்கை இன்னிசை அரங்கம் 3 குறிஞ்சிப்பாட்டின் மலர்க்காட்சி 4. புறநானூறு (95,195) -போரை நிறுத்திய ஓளவையார். | | |

| | | |
|---|---------------|---|
| UNIT II | அறநெறித்தமிழ் | 6 |
| 1. அறநெறி வகுத்த திருவள்ளுவர் அறம் வலியுறுத்தல், அன்புடைமை ஒப்புறவு அறிதல், ஈகை, புகழ் 2. பிற அறநூல்கள் இலக்கிய மருந்து ஏலாதி, சிறுபஞ்சமூலம். திரிகடுகம் ஆசாரக்கோவை (தூய்மையை வலியுறுத்தும் நூல்) | | |

| | | |
|---|----------------------|---|
| UNIT III | இரட்டைக்காப்பியங்கள் | 6 |
| 1. கண்ணகியின் புரட்சி சிலப்பதிகார வழக்குரை காதை 2. சமூகசேவை இலக்கியம் மணிமேகலை சிறைக்கோட்டம் அறக்கோட்டமாகிய காதை | | |

| | | |
|--|--------------------|---|
| UNIT IV | அருள் நெறித் தமிழ் | 6 |
| 1. சிறுபாணாற்றுப்படை - பாரி முல்லைக்குத் தேர் கொடுத்தது. பேகன் மயிலுக்குப் போர்வை கொடுத்தது, அதியமான் ஓளவைக்கு நெல்லிக்கனி கொடுத்தது. அரசர் பண்புகள் 2. நற்றிணை - அன்னைக்குரிய புன்னை சிறப்பு 3. திருமந்திரம் (617,618) - இயமம் நியமம் விதிகள் 4. தர்மச்சாலையை நிறுவிய வள்ளலார் 5. புறநானூறு - சிறுவனே வள்ளலானான் 6. அகநானூறு (4) - வண்டு நற்றிணை (11) - நண்டு கலித்தொகை (11) - யானை, புறா, ஐந்திணை 50 (27) - மான் | | |


HEAD OF THE DEPARTMENT
Dept. of Science & Humanities,
Jay Shriram Engineering College
Dharapuram, Vinashipalayam,
TIRUPUR -638 660, Tamilnadu.


ஆகியவை பற்றிய செய்திகள்

| UNIT V | நவீன தமிழ் இலக்கியம் | 6 |
|--|----------------------|---|
| <p>1. உரைநடைத் தமிழ். -தமிழின் முதல் புதினம். -தமிழின் முதல் சிறுகதை. -கட்டுரை இலக்கியம். -பயண இலக்கியம். -நாடகம்.</p> <p>2. நாட்டு விடுதலை போராட்டமும் தமிழ் இலக்கியமும், 3. சமுதாய விடுதலையும் தமிழ் இலக்கியமும். 4. பெண் விடுதலையும் விளிம்பு நிலையினரின் மேம்பாட்டில் தமிழ் இலக்கியமும். 5. அறிவியல் தமிழ். 6. இணையத்தில் தமிழ். 7. சுற்றுச்சூழல் மேம்பாட்டில் தமிழ் இலக்கியம்</p> | | |

L:45 T:0 P:0 T: 45 PERIODS

தமிழ் இலக்கிய வெளியீடுகள் / புத்தகங்கள்

1. தமிழ் இணைய கல்விக்கழகம் (Tamil Virtual University)-www.tamilvu.org
2. தமிழ் விக்கிப்பீடியா (Tamil Wikipedia) -https://ta.wikipedia.org
3. தர்மபுர ஆதீன வெளியீடு
4. வாழ்வியல் களஞ்சியம் தமிழ்ப் பல்கலைக்கழகம் தஞ்சாவூர்
5. தமிழ்கலைக் களஞ்சியம்
-தமிழ் வளர்ச்சித் துறை (thamilvalarchithurai.com)
6. அறிவியல் களஞ்சியம்
-தமிழ்ப் பல்கலைக்கழகம் தஞ்சாவூர்


HEAD OF THE DEPARTMENT
Dept. of Science & Humanities
Jay Shriram Engineering College
Dharapuram Road, Avinashipalayam,
TIRUPUR -638 660, Tamilnadu.