## SEMESTER III

| S. No | Category | Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|---|---|
| **Theory** | | | | | | | |
| 1 | MC | GE20301 | தமிழரும் தொழில்நுட்பமும்/ Tamils and Technology | 1 | 0 | 0 | 1 |
| 2 | BS | MA20302 | Linear Algebra and Partial Differential Equations | 3 | 1 | 0 | 4 |
| 3 | ES | IT20304 | Fundamentals of Data structures in C | 3 | 0 | 0 | 3 |
| 4 | PC | EC20301 | Analog Electronics | 3 | 0 | 0 | 3 |
| 5 | PC | EC20302 | Digital Electronics | 3 | 0 | 0 | 3 |
| 6 | PC | EC20303 | Electromagnetic Fields and Waves | 3 | 0 | 0 | 3 |
| 7 | MC | MC20301 | Value Education | 2 | 0 | 0 | 0 |
| **Practical** | | | | | | | |
| 7 | PC | EC20304 | Analog Electronics Laboratory | 0 | 0 | 4 | 2 |
| 8 | PC | EC20305 | Digital Electronics Laboratory | 0 | 0 | 4 | 2 |
| 9 | ES | IT20307 | Fundamentals of Data structures in C laboratory | 0 | 0 | 4 | 2 |
| | | | **Total** | **18** | **1** | **12** | **23** |

## SEMESTER IV

| S.No. | Category | Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|---|---|
| **Theory** | | | | | | | |
| 1 | BS | MA20402 | Probability and Random processes | 3 | 1 | 0 | 4 |
| 2 | ES | EC20401 | Control Systems | 3 | 0 | 0 | 3 |
| 3 | PC | EC20402 | Signals and Systems | 3 | 1 | 0 | 4 |
| 4 | PC | EC20403 | Analog Integrated Circuits | 3 | 0 | 0 | 3 |
| 5 | PC | EC20404 | Microprocessors and Microcontrollers | 3 | 0 | 0 | 3 |
| **Practical** | | | | | | | |
| 6 | PC | EC20405 | Analog Integrated Circuits Laboratory | 0 | 0 | 4 | 2 |
| 7 | PC | EC20406 | Microprocessors and Microcontrollers Laboratory | 0 | 0 | 4 | 2 |
| 8 | EE | EN20401 | English Proficiency Course laboratory | 0 | 0 | 2 | 1 |
| | | | **TOTAL** | **15** | **2** | **10** | **22** |

## SEMESTER III

| S. No | Category | Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|---|---|
| **Theory** | | | | | | | |
| 1 | BS | MA20302 | Linear Algebra and Partial Differential Equations | 3 | 1 | 0 | 4 |
| 2 | ES | IT20304 | Fundamentals of Data structures in C | 3 | 0 | 0 | 3 |
| 3 | PC | EC20301 | Analog Electronics | 3 | 0 | 0 | 3 |
| 4 | PC | EC20302 | Digital Electronics | 3 | 0 | 0 | 3 |
| 5 | PC | EC20303 | Electromagnetic Fields and Waves | 3 | 0 | 0 | 3 |
| 6 | MC | MC20301 | Value Education | 2 | 0 | 0 | 0 |
| **Practical** | | | | | | | |
| 7 | PC | EC20304 | Analog Electronics Laboratory | 0 | 0 | 4 | 2 |
| 8 | PC | EC20305 | Digital Electronics Laboratory | 0 | 0 | 4 | 2 |
| 9 | ES | IT20307 | Fundamentals of Data structures in C laboratory | 0 | 0 | 4 | 2 |
| | | | **Total** | **17** | **1** | **12** | **22** |

## SEMESTER IV

| S. No | Category | Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|---|---|
| **Theory** | | | | | | | |
| 1 | BS | MA20402 | Probability and Random processes | 3 | 1 | 0 | 4 |
| 2 | ES | EC20401 | Control Systems | 3 | 0 | 0 | 3 |
| 3 | PC | EC20402 | Signals and Systems | 3 | 1 | 0 | 4 |
| 4 | PC | EC20403 | Analog Integrated Circuits | 3 | 0 | 0 | 3 |
| 5 | PC | EC20404 | Microprocessors and Microcontrollers | 3 | 0 | 0 | 3 |
| **Practical** | | | | | | | |
| 6 | PC | EC20405 | Analog Integrated Circuits Laboratory | 0 | 0 | 4 | 2 |
| 7 | PC | EC20406 | Microprocessors and Microcontrollers Laboratory | 0 | 0 | 4 | 2 |
| 8 | EE | EN20401 | English Proficiency Course laboratory | 0 | 0 | 2 | 1 |
| | | | **TOTAL** | **15** | **2** | **10** | **22** |

GE20301 **தமிழரும் தொழில்நுட்பமும்** L T P C
1 0 0 1

அலகு I **நெசவு மற்றும் பானைத் தொழில்நுட்பம்** 3

சங்க காலத்தில் நெசவுத் தொழில் - பானைத் தொழில்நுட்பம் - கருப்பு சிவப்பு பாண்டங்கள் - பாண்டங்களில் கீறல் குறியீடுகள்.

அலகு II **வடுவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்** 3

சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் &சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு - சங்க காலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் - சிலப்பதிகாரத்தில் மேடை வடிவமைப்பு பற்றிய விவரங்கள் - மாமல்லபுரச் சிற்பங்களும், கோவில்களும் - சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் - நாயக்கர் காலக் கோயில்கள் - மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் - செட்டி நாட்டு வீடுகள் - பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ - சாரோசெனிக் கட்டிடக்கலை.

அலகு III **உற்பத்தி தொழில் நுட்பம்** 3

கப்பல் கட்டும் கலை - உலோகவியல் - இரும்புத் தொழிற்சாலை - இரும்பு உருக்குதல், எஃகு - வரலாற்றுச் சின்னங்களாக செம்பு மற்றும் தங்க நாணயங்கள் - நாணயங்கள் அச்சடித்தல் - மணி உருவாக்கும் தொழிற்சாலைகள் - கல்மணிகள், கண்ணாடி மணிகள் - சுடுமண் மணிகள் - சங்கு மணிகள் -எலும்புத் துண்டுகள் - தொல்லியல் சான்றுகள் - சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.

அலகு IV **வேளாண்மை மற்றும் நீர்பாசனத் தொழில்நுட்பம்** 3

அணை - ஏரி, குளங்கள், மதகு - சோழர்காலக் குமிழித் தூம்பின் முக்கியத்துவம் - கால்நடை பராமரிப்பு - கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் - வேளாண்மை மற்றும் வேளாண்மை சார்ந்த செயல்பாடுகள் - கடல்சார் அறிவு - மீன்வளம் - முத்து மற்றும் முத்துக்குளித்தல் - பெருங்கடல் குறித்த பண்டைய அறிவு -அறிவுசார் சமூகம்...

அலகு V *அறிவியல் தமிழ் மற்றும் கணித்தமிழ்*

அறிவியல் தமிழின் வளர்ச்சி -கணித்தமிழ் வளர்ச்சி - தமிழ் நூல்களை மின்பதிப்பு செய்தல் - தமிழ் மென்பொருட்கள் உருவாக்கம் - தமிழ் இணையக் கல்விக்கழகம் - தமிழ் மின் நூலகம் - இணையத்தில் தமிழ் அகராதிகள் - சொற்குவைத் திட்டம்.

TOTAL PERIODS 15

**TEXT CUM REFERENCE BOOKS:**


1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே.பிள்ளை. (வெளியீடு தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம் ( விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு).
4. பொருநை – ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு).
5. Social Life of Tamils (Dr.K.K.Pillay) A Joint publication of TNTB & ESC and RMRL – (in print).
6. Social Life of the Tamils – The Classical Period (Dr.S.Singaravelu) (Published by International institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subramanian, Dr.K.D.Thirunavukkarasu)
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by International institute of Tamil Studies)
9. Keeladi – 'Sangam City Civilzation on the vanks of river vaigai' (Jointly Published by Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by the author)
11. Porunai Civilization (Jointly Published by Department of Arcaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamilnadu).
12. Journey of Civilization Indus to vaigai (R.Balakrishnan) (Published by RMRL) – Reference Book

| GE20301 | TAMILS AND TECHNOLOGY | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 0 | 1 |

**UNIT I WEAVING AND CERAMIC TECHNOLOGY** 3

Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.

**UNIT II DESIGN AND CONSTRUCTION TECHNOLOGY** 3

Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.

**UNIT III MANUFACTURING TECHNOLOGY** 3

Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting,steel -Copper and goldCoins as source of history - Minting of Coins – Beads making-industries Stone beads -Glass beads - Terracotta beads -Shell beads/ bone beats - Archeological evidences - Gem stone types described in Silappathikaram.

**UNIT IV AGRICULTURE AND IRRIGATION TECHNOLOGY** 3

Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries – Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.

**UNIT V SCIENTIFIC TAMIL & TAMIL COMPUTING** 3

Development of Scientific Tamil - Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project

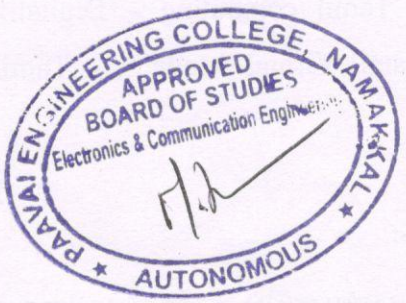
**TOTAL PERIODS 15**

**TEXT CUM REFERENCE BOOKS:**


1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே.பிள்ளை. (வெளியீடு தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம் ( விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை

வெளியீடு).

4. பொருநை – ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு).
5. Social Life of Tamils (Dr.K.K.Pillay) A Joint publication of TNTB & ESC and RMRL – (in print).
6. Social Life of the Tamils – The Classical Period (Dr.S.Singaravelu) (Published by International institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subramanian, Dr.K.D.Thirunavukkarasu)
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by International institute of Tamil Studies)
9. Keeladi – 'Sangam City Civilzation on the vanks of river vaigai' (Jointly Published by Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by the author)
11. Porunai Civilization (Jointly Published by Department of Arcaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamilnadu).
12. Journey of Civilization Indus to vaigai (Ṙ.Balakrishnan) (Published by RMRL) – Reference Book



**MA20302** **LINEAR ALGEBRA AND PARTIAL DIFFERENTIAL EQUATIONS** **3 1 0 4**

**COURSE OBJECTIVES**

To enable the students to

- apply the dependent and independent relations of vector spaces.
- learn and apply the concepts of linear transformation and diagonalisation.
- solve Fourier series and analyze the representation of periodic functions
- formulate and solve partial differential equations.
- use mathematical tools for the solution of PDEs that model several physical processes

**UNIT I VECTOR SPACES** **12**

Vector spaces - Subspaces - Linear combinations and Linear system of equations - Linear dependence and linear independence - Bases and Dimensions.

**UNIT II LINEAR TRANSFORMATION AND INNER PRODUCT SPACES** **12**

Linear Transformation - Null spaces and ranges - Dimension theorem - Matrix representation of a linear transformations - Review of Eigen values and Eigen vectors - Diagonalizability. Inner product, norms - Gram Schmidt orthogonalization process - Adjoint of linear operations - Least square approximation.

**UNIT III FOURIER SERIES** **12**

Dirichlet's conditions - General Fourier series - Odd and even functions - Half range series - Complex form of Fourier Series - Parseval's identity - Harmonic Analysis.

**UNIT IV PARTIAL DIFFERENTIAL EQUATIONS** **12**

Formation of partial differential equations - Lagrange's linear equation - Solutions of four standard types of first order partial differential equations - Linear partial differential equations of second order with constant coefficients.

**UNIT V FOURIER SERIES SOLUTION TO PARTIAL DIFFERENTIAL EQUATIONS** **12**

Solutions of one-dimensional wave equation - One dimensional equation of heat conduction - Steady state solution of two-dimensional equation of heat conduction.

**TOTAL PERIODS: 60**

**COURSE OUTCOMES**

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

- employ the dependent and independent relations of vector spaces.
- demonstrate the knowledge of linear transformation and diagonalisation.
- derive Fourier series, their possible forms of representations of periodic functions

- formulate and solve partial differential equations
- solve certain boundary value problems and apply the methods and results in engineering applications.

**TEXT BOOKS**

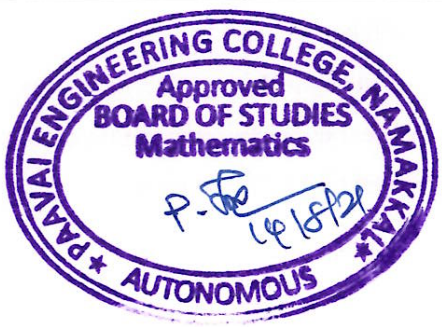

1. Veerarajan T., "Transforms and Partial Differential Equations", Tata McGraw Hill Education Pvt. Ltd., New Delhi, Second reprint, 2012.
2. Friedberg, A.H., Insel, A.J. and Spence, L., Linear Algebra‖, Prentice - Hall of India, New Delhi, 2004.
3. Narayanan S., Manickavasagam Pillai.T.K and Ramanaiah.G "Advanced Mathematics for Engineering Students" ,Vol. II & III, S.Viswanathan Publishers Pvt Ltd. 1998.


**REFERENCE BOOKS**


1. Kumaresan, S., Linear Algebra – A geometric approach‖, Prentice – Hall of India, New Delhi, Reprint, 2010.
2. Strang, G., Linear Algebra and its applications‖, Thomson (Brooks/Cole), New Delhi, 2005.
3. Larry C. Andrews, Bhimsen K. Shivamoggi, "Integral Transforms for Enginears", SPIE Optical Engineering press, Washington USA (1999).
4. Ramana.B.V., "Higher Engineering Mathematics", Tata Mc-GrawHill Publishing Company limited, New Delhi (2010).
5. Erwin Kreyszig., "Advanced Engineering Mathematics" 10th Edition, Wiley Publications.


**CO-PO MAPPING :**

| Mapping of Course Outcomes with Programme Outcomes : (1,2,3 indicates the strength of correlation) 3 – Strong , 2 – Medium , 1 – Weak | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **COs** | **Programme Outcomes (POs)** | | | | | | | | | | | | | |
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| **CO1** | 3 | 3 | 3 | 3 | - | - | - | - | - | - | - | - | 3 | 3 |
| **CO2** | 3 | 3 | 3 | 3 | - | - | - | - | - | - | - | - | 3 | 3 |
| **CO3** | 3 | 3 | 3 | - | - | - | - | - | - | - | - | - | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 3 | - | - | - | - | - | - | - | - | 3 | 3 |
| **CO5** | 3 | 3 | 3 | - | - | - | - | - | - | - | - | - | 3 | 3 |



| IT20304 | FUNDAMENTALS OF DATA STRUCTURES IN C | 3 | 0 | 0 | 3 |
|---|---|---|---|---|---|

**COURSE OBJECTIVES**

To enable students to

- introduce the basics of C programming language.
- learn the concepts of advanced features of C.
- understand the concepts of ADTs and linear data structures.
- know the concepts of non-linear data structure and hashing.
- familiarize the concepts of sorting and searching techniques

**UNIT I C PROGRAMMING BASICS** **9**

Structure of a C program - compilation and linking processes, Constants, Variables, Data Types, Expressions using operators in C, Managing Input and Output operations; Decision Making and Branching - Looping statements; Introduction to Arrays - Declaration, Initialization, One dimensional array and Two dimensional arrays; String - String operations - length, compare, concatenate, copy.

**UNIT II FUNCTIONS, POINTERS, STRUCTURES AND UNIONS** **9**

Functions - Pass by value, Pass by reference, Recursion; Pointers - Definition, Initialization, Pointers arithmetic; Structures and unions - Structure - definition, Structure within a structure; Union - Programs using structures and Unions; Storage classes - Pre-processor directives.

**UNIT III LINEAR DATA STRUCTURES** **9**

Abstract Data Types (ADTs) - List ADT - array based implementation - linked list implementation - singly linked lists - Polynomial manipulation - Stack ADT - Queue ADT - Evaluating arithmetic expressions.

**UNIT IV NON-LINEAR DATA STRUCTURES** **9**

Trees - Binary Tress - Binary tree representation and traversals - AVL trees - Graph and its representations - Graph Traversals - Representations of Graphs - Breadth first search - Depth first search - connected components.

**UNIT V SEARCHING AND SORTING ALGORITHMS** **9**

Searching: Linear search - Sequential search - Binary search; Sorting: Bubble sort - Insertion sort - Merge sort - Quick sort - Selection sort - Divide and Conquer sort - Heap sort.

**TOTAL PERIODS** **45**

**COURSE OUTCOMES**

At the end this course, students will be able to

- apply advanced features of C in solving problems.
- develop C programs for any real world/technical application.
- write functions to implement linear data structure operations.
- implement the given problem using non–linear data structure.

- appropriately use sort and search algorithms for a given application.

**TEXT BOOKS**


1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Second Edition, Pearson Education, 1997.
2. Reema Thareja, "Programming in C", Second Edition, Oxford University Press, 2016.


**REFERENCES**


1. Brian W. Kernighan, Rob Pike, "The Practice of Programming", Pearson Education, 1999.
2. Paul J. Deitel, Harvey Deitel, "C How to Program", Seventh Edition, Pearson Education, 2013.
3. Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, "Data Structures and Algorithms", Pearson Education,1983.
4. Ellis Horowitz, Sartaj Sahni and Susan Anderson, "Fundamentals of Data Structures", Galgotia, 2008.


**CO-PO MAPPING:**

| Mapping of Course Outcomes with Programme Outcomes (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **COs** | **Programme Outcomes(POs)** | | | | | | | | | | | | | |
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| **CO1** | 2 | 3 | 2 | 2 | 1 | 2 | - | - | - | - | - | 3 | 2 | 2 |
| **CO2** | 3 | 3 | 3 | 3 | 2 | 3 | - | - | - | - | - | 2 | 3 | 2 |
| **CO3** | 2 | 3 | 3 | 3 | 2 | 3 | - | - | - | - | - | 3 | 3 | 2 |
| **CO4** | 3 | 3 | 2 | 2 | 3 | 3 | - | - | - | - | - | 3 | 3 | 2 |
| **CO5** | 3 | 3 | 3 | 3 | 3 | 3 | - | - | - | - | - | 3 | 2 | 2 |

**EC20301** **ANALOG ELECTRONICS** **3 0 0 3**

**COURSE OBJECTIVES**

To enable the students to

- understand the methods of transistor biasing.
- design the various amplifier circuits.
- analyze the feedback amplifiers and oscillators circuits.
- explore the basics of tuned amplifiers and power amplifiers.
- acquire the concepts of power supplies.

**UNIT I BJT BIASING** **9**

Transistor Biasing - DC, AC load line, Operating point ; Various biasing method for BJT - Stability factors; Bias compensation techniques; Thermal stability; FET Biasing.

**UNIT II AMPLIFIERS** **9**

BJT amplifier design - Hybrid equivalent circuits; Analysis of CE, CC and CB Configuration using BJT, Miller's theorem; Multistage amplifiers - Coupling methods, two stage RC coupled amplifiers; Differential amplifier - Modes of gain, Methods of improving CMRR.

**UNIT III FEEDBACK AMPLIFIERS AND OSCILLATORS** **9**

Basic concepts of feedback - Block diagram, General characteristics of negative feedback ,Transfer gain, Cut off frequency with feedback, Effect of negative feedback on input and output resistances ; Steps and Design of Feedback Amplifier circuits ; Oscillator - classification, Barkhausen criterion; Analysis of RC oscillators - RC Phase shift ,Wein bridge oscillators ; LC oscillators - Hartley, Colpitts Oscillator,Clapp Oscillator,Crystal Oscillator.

**UNIT IV TUNED AMPLIFIERS AND POWER AMPLIFIERS** **9**

Tuned amplifiers - Classification of tuned amplifiers, Analysis of capacitor coupled tuned amplifier , Effect of cascading of single tuned and Double tuned amplifier on Bandwidth ; Power amplifiers - Direct Coupled Class A, Complementary Symmetry Class B, Class AB, Class C Power Amplifier, Parameters, Conversion efficiency.

**UNIT V POWER SUPPLIES** **9**

Linear Mode Power Supply; Half wave, Full wave Rectifiers, parameters; Filters - L, C, LC, CLC or $\pi$ filters; Series and Shunt Voltage Regulators; Switched mode power supply (SMPS), Universal Power Supply - online, offline UPS.

**TOTAL PERIODS 45**

## COURSE OUTCOMES

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

- identify suitable biasing method for BJT.
- design single stage, multistage and differential amplifiers using BJT.
- analyze the performance of feedback amplifiers and oscillators.
- apply and verify the concepts of tuned amplifiers and power amplifiers.
- design DC power supplies and filters.

## TEXT BOOKS


1. Boylestad L Robert and Nashelsky Louis., "Electronic Devices and circuits", 11th Edition, Prentice Hall of India, New Delhi, 2014.
2. Salivahanan.S, Sureshkumar.N, "Electronic Devices and Circuits", 3rd edition, McGraw Hill, 2014.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1. John D Ryder., "Electronic fundamentals and Applications: Integrated and Discrete systems", 5th Edition, PHI, 2003.
2. Adel .S. Sedra, Kenneth C. Smith, "Micro Electronic circuits", 6th Edition, Oxford University Press, 2010.
3. David A Bell., "Electronic Devices and Circuits", Prentice Hall of India, New Delhi, 2010.
4. Donald .A. Neamen, "Electronic Circuit Analysis and Design" ,2nd edition, Tata McGraw Hill, 2009.


**CO-PO MAPPING :**

| Mapping of Course Outcomes with Programme Outcomes : (1,2,3 indicates the strength of correlation) 3 – Strong , 2 – Medium , 1 – Weak | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **COs** | **Programme Outcomes (POs)** | | | | | | | | | | | | | |
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| **CO1** | 3 | 2 | 1 | 2 | - | - | - | - | 1 | - | - | 2 | 2 | 2 |
| **CO2** | 3 | 2 | 1 | 2 | - | - | - | - | 1 | - | - | 2 | 2 | 2 |
| **CO3** | 3 | 2 | 1 | 2 | - | - | - | - | 1 | - | - | 2 | 2 | 2 |
| **CO4** | 3 | 2 | 2 | 2 | - | - | - | - | 1 | - | - | 2 | 2 | 2 |
| **CO5** | 3 | 2 | 2 | 2 | - | - | - | - | 1 | - | - | 2 | 2 | 2 |

**EC20302** **DIGITAL ELECTRONICS** **3 0 0 3**

**COURSE OBJECTIVES**

To enable the students to

- understand the fundamentals of boolean algebra and digital logic gates
- know the concepts of various combinational circuits.
- acquire knowledge about different synchronous sequential circuits.
- be familiar with the operation of asynchronous sequential circuits.
- acquire basic knowledge about memory devices and HDL programming.

**UNIT I BOOLEAN ALGEBRA AND LOGIC GATES** **9**

Boolean postulates and laws - De-Morgan's Theorem, Principle of Duality; Boolean functions - Minimization of Boolean functions, Karnaugh map minimization, Tabulation method, Don't care Conditions; Logic Gates Implementations - Logic Functions using gates, NAND, NOR; TTL - CMOS, NAND, NOR, NOT; Tristate gates.

**UNIT II COMBINATIONAL CIRCUITS** **9**

Design procedure of Combinational circuits - Adders, Subtractors, 4-bit Parallel adder/Subtractor, Carry look ahead adder, BCD adder, Multiplexer, Demultiplexer, Encoder, Decoder, Magnitude Comparator, Parity generator and checker; Code converters; BCD to seven segment displays.

**UNIT III SEQUENTIAL CIRCUITS** **9**

Flip flops - Triggering of Flip-flops, Realization of flip flop using other flip flops; Latch - Types; Classification of sequential circuits - Asynchronous and Synchronous counters; Moore and Mealy; Design of Synchronous counters - Modulo - N counter, Ring counter, Johnson Counter; Shift registers - SISO, SIPO, PISO, PIPO;

**UNIT IV ASYNCHRONOUS SEQUENTIAL CIRCUITS** **9**

Design of fundamental mode and pulse mode circuits - Primitive flow table, Minimization of Primitive flow table, State assignment, Excitation table; Cycles - Race Free State assignment; ASM Chart; Hazards - Static, Dynamic, Essential Hazards, Hazards elimination.

**UNIT V MEMORY DEVICES AND HDL** **9**

Classification of memories - ROM organization, types; RAM organization, types - Static RAM Cell, Bipolar RAM cell, Dynamic RAM cell; Memory decoding; Memory Expansion; Programmable Logic Devices - PLA, PAL, FPGA; Introduction to HDL - Simple programs Using Verilog HDL.

**TOTAL PERIODS 45**

## COURSE OUTCOMES

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

- use boolean functions in digital design.
- implement various combinational circuits.
- design different synchronous sequential circuits for real time applications.
- identify the effect of hazards in asynchronous sequential circuits.
- compile the digital logic circuits using Verilog HDL.

## TEXT BOOKS


1. M. Morris Mano, "Digital Design", 3rd edition, Prentice Hall of India Pvt. Ltd., New Delhi, 2003.
2. H. Charles Roth Jr, "Digital System Design using VHDL", Thomson/ Brookscole, 2005.


## REFERENCES


1. S. Salivahanan and S. Arivazhagan, "Digital Circuits and Design", 3rd Edition, Vikas Publishing House Pvt.Ltd, New Delhi, 2007.
2. John .M Yarbrough, "Digital Logic Applications and Design", Thomson Publications, New Delhi,2007.
3. Charles H.Roth , "Fundamentals of Logic Design", Thomson Publication Company, 2003.
4. Donald P.Leach and Albert Paul Malvino, "Digital Principles and Applications", 5th edition, Tata Mc-Graw Hill Publishing Company Limited, New Delhi, 2003.


**CO-PO MAPPING :**

| Mapping of Course Outcomes with Programme Outcomes : (1,2,3 indicates the strength of correlation) 3 – Strong , 2 – Medium , 1 – Weak | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **COs** | **Programme Outcomes (POs)** | | | | | | | | | | | | | |
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| **CO1** | 3 | 2 | 2 | 2 | 2 | 2 | - | - | 1 | - | - | 2 | 2 | 2 |
| **CO2** | 3 | 2 | 2 | 2 | 2 | 2 | - | - | 1 | - | - | 2 | 2 | 2 |
| **CO3** | 3 | 2 | 2 | 2 | 2 | 2 | - | - | 1 | - | - | 2 | 2 | 2 |
| **CO4** | 3 | 2 | 2 | 2 | 2 | 2 | - | - | 1 | - | - | 2 | 2 | 2 |
| **CO5** | 3 | 2 | 2 | 2 | 2 | 2 | - | - | 1 | - | - | 2 | 2 | 2 |

**EC20303** **ELECTROMAGNETIC FIELDS AND WAVES** **3 0 0 3**

**COURSE OBJECTIVES**

To enable the students to

- be familiar with the fields and potentials due to static charges.
- acquire knowledge on the effect of materials in static electric fields.
- gain knowledge about the parameters of static magnetic fields.
- determine the relation between the static and time varying fields
- understand the propagation of waves in different media.

**UNIT I ELECTROSTATIC FIELDS** **9**

Co-ordinate systems ; Vector differential operators; Coulombs law; Divergence theorem; Stokes theorem; Electric field intensity - charge distribution, electric flux density - Applications of Gauss's law, Electric potential, Electric dipole, Energy and Energy density.

**UNIT II ELECTRIC FIELDS IN MATERIAL SPACE** **9**

Properties of materials ; Convection, Conduction, displacement current ; Conductors - Resistance; Polarization in dielectrics - Dielectric constant, Dielectric strength ; Uniqueness theorem ; Continuity equation, relaxation time ; Boundary conditions; Poisson's and Laplace's equation - General procedure for solving Poisson's and Laplace's equation; Capacitance - Types of capacitors; Method of images.

**UNIT III MAGNETOSTATIC FIELDS** **9**

Biot- Savart'slaw - Magnetic flux Density, Field intensity ; Ampere's circuit law - applications of Ampere's Law , Magnetic scalar , vector potentials ; Force due to magnetic fields - Magnetic Torque, magnetic moment; magnetic boundary conditions; Inductors and Inductances - magnetic energy, magnetic circuits.

**UNIT IV TIME VARYING FIELDS AND MAXWELL'S EQUATIONS** **9**

Faraday's law -Transformer, motional Electromotive forces; Effect of Displacement current; Maxwell's equation in final forms; time varying potentials; time harmonic fields.

**UNIT V ELECTROMAGNETIC WAVE PROPAGATION** **9**

Plane Wave propagation - lossy dielectric, lossless dielectrics, free space, good conductors; Power and Poynting vector; Reflection of plane waves - normal incidence; Application-microwave oven.

**TOTAL PERIODS** **45**

## COURSE OUTCOMES

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

- determine the field potentials due to static changes.
- analyze the effect of field on materials and solve boundary value problems.
- find out field intensity due to magnetostatic fields.
- interpret Maxwell's equations for time varying electromagnetic fields for different media.
- explain the propogation of waves in different medias.

## TEXT BOOKS


1. Mathew.N.O. Sadiku, "Principles of Electromagnetics", Oxford University Press, 2011.
2. E.C. Jordan and K.G. Balmain, "Electromagnetic Waves and Radiating Systems", Prentice-Hall of India ,2nd edition, 2007.


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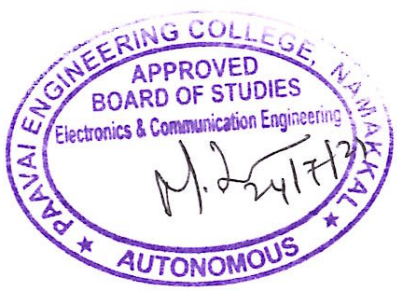
1. Kraus, Fleisch, "Electromagnetics with Applications", McGraw-Hill, 2005.
2. David. K. Cheng, "Field and wave Electromagnetics", 2nd edition, Pearson education, 2004.
3. Karl E. Longman and Sava V. Savov, "Fundamentals of Electro-Magnetics", Prentice Hall of India, 2006.
4. W.H. Hayt and A. Buck, "Engineering ElectroMagnetics", 7th Edition, McGraw Hill, 2006.


**CO-PO MAPPING :**

**Mapping of Course Outcomes with Programme Outcomes :**

**(1,2,3 indicates the strength of correlation) 3 – Strong , 2 – Medium , 1 – Weak**

| COs | Programme Outcomes (POs) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
| CO1 | 3 | 3 | 3 | 2 | - | - | - | - | - | - | - | 2 | 3 | 3 |
| CO2 | 3 | 3 | 3 | 2 | - | - | - | - | - | - | - | 2 | 3 | 3 |
| CO3 | 3 | 3 | 3 | - | - | - | - | - | - | - | - | 2 | 3 | 3 |
| CO4 | 3 | 3 | 3 | 2 | - | - | - | - | - | - | - | 2 | 3 | 3 |
| CO5 | 3 | 3 | 3 | 2 | - | - | - | - | - | - | - | 3 | 3 | 3 |



MC20301 **VALUE EDUCATION** 2 0 0 0

**COURSE OBJECTIVES**

To enable students to

- develop the individual multi-dimensionally in physical, intellectual, emotional, and spiritual dimensions.
- facilitateindividuals think about and reflect on different values.
- understandtheir responsibility in making choices and the practical implications of expressing them.
- Instigate to choose their personal, social, moral, and spiritual values.
- designand chisel the overall personality of an individual.

**UNIT I PERSONAL VALUES** 6

Value Education – Definition, Types of values; Human values - Respect, Acceptance, Consideration, Appreciation, Listening, Openness, Affection, Patience, Honesty, Forgiveness, Sacrifice, Authenticity, Self Control, Altruism, Tolerance and Understanding, Wisdom, Decision making, Self actualization, Character formation towards positive Personality,Contentment; -Religious Values - Humility, Sympathy and Compassion, Gratitude. Peace, Justice, Freedom, Equality.

**UNIT II COMMUNAL VALUES** 6

Social Values - Pity and probity - Self-control - Respect to - Age, Experience, Maturity, Family members, Neighbors- Universal Brotherhood - Flexibility -Peer pressure - Sensitization towards Gender Equality, Physically challenged, intellectuallychallenged - Reliability - Unity - Modern Challenges of Adolescent Emotions and behavior - Comparison and Competition- Positive and Negative thoughts- Arrogance, Anger and Selfishness.

**UNIT III ENGINEERING ETHICS** 6

Professional Values - Knowledge thirst - Sincerity in profession- Regularity, Responsibility, Punctuality and Faith - Perseverance - Courage - Competence - Co-operation- Curbing unethical practices - Integrity, Social Consciousness and Responsibility.Global Values - Computer Ethics – Moral Leadership - Code of Conduct - Corporate Social Responsibility.

**UNIT IV SPIRITUAL VALUES** 6

Developing Spirituality - Thinking process, Moralization of Desires - Health benefits- Physical exercises - Mental peace - Meditation - Objectives, Types, Effects on body, mind, and soul- Yoga - Objectives, Types, Asanas. Family values -family's structure, function, roles, beliefs, attitudes and ideals, Family Work Ethic, Family Time, Family Traditions.

**UNIT V HUMAN RIGHTS**

Classification of Human Rights - Right to Life, Liberty and Dignity- Right to Equality - Right against Exploitation - Cultural and Educational Rights- Physical assault and Sexual harassment - Domestic violence.

**TOTAL PERIODS: 30**

## COURSE OUTCOMES

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

- cultivate the values needed for peaceful living in the existing society.
- comprehend humanistic values to develop peace in the world.
- foster ethics in profession and usage of technology.
- orient with the importance of value education towards personal, group and spiritual attributes.
- nurture physical, mental, spiritual growth to face the competitive world.

## REFERENCES


1. Little, William, An introduction of Ethics. Allied publisher, Indian Reprint 1955.
2. Sharma, S.P. Moral and Value Education; Principles and Practices, Kanishka publishers, 2013.
3. "Values (Collection of Essays)". Sri Ramakrishna Math. Chennai. 1996


## CO/PO MAPPING:

| Mapping of Course Outcomes with Programme Outcomes (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| COs | Programmes Outcomes (POs) | | | | | | | | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
| CO1 | - | - | - | - | - | - | - | 2 | 2 | - | - | 2 | - | 2 |
| CO2 | - | - | - | 2 | - | 2 | - | 1 | 3 | 2 | 1 | 3 | - | 2 |
| CO3 | - | - | 3 | 2 | 2 | 3 | 2 | 3 | 3 | 1 | 3 | 3 | 2 | 3 |
| CO4 | - | - | 3 | 1 | - | 2 | - | - | 1 | - | - | 3 | 2 | - |
| CO5 | - | - | - | - | - | 1 | - | - | - | - | - | - | 3 | - |

**EC20304** **ANALOG ELECTRONICS LABORATORY** **0 0 4 2**

## COURSE OBJECTIVES

To enable the students to

- gain the knowledge about frequency response of different types of amplifiers.
- analyze the frequency response of multi-stage amplifiers and get the knowledge about large signal amplifiers.
- illustrate the working principle of rectifiers.
- gain hands on experience in designing feedback amplifiers and oscillators.

## LIST OF EXPERIMENTS

1. Design the biasing methods of fixed bias and Voltage divider bias amplifier using BJT.
2. Determination of the Frequency response of CE/CB/CC amplifier.
3. Measurement of CMRR of differential amplifier.
4. Determination of the bandwidth of Cascade / Cascode amplifier.
5. Determination of the Frequency response of Class C tuned amplifier.
6. Design of Direct coupled Class A power amplifiers and determination its efficiency.
7. Design of Complementary symmetry Class B power amplifiers and determination its efficiency.
8. Determination of the efficiency and ripple factor of Half wave rectifier/ Full wave rectifier.
9. Design of Feedback amplifier circuits.
10. Design of RC oscillators (RC Phase shift / Wien bridge).
11. Design of LC oscillators (Hartley /Colpitts).

## SIMULATION USING PSpice/MULTISIM/ EQUIVALENT SOFTWARE PACKAGE

1. Simulation of BJT amplifier Configurations (CE/CB/CC).
2. Simulation of Direct coupled Class A power amplifiers.
3. Simulation of clippers and clampers.
4. Simulation of integrator and differentiator.

**TOTAL PERIODS 60**

## COURSE OUTCOMES

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

- design and analyse the frequency response of different types of Amplifiers.
- measure CMRR in differential amplifier.
- analyze the bandwidth of multi-stage amplifiers and get the frequency response of power amplifiers.
- analyze the feedback,differential, power amplifiers and design oscillators for various specifications.

**CO-PO MAPPING :**

| Mapping of Course Outcomes with Programme Outcomes :<br>(1,2,3 indicates the strength of correlation) 3 – Strong , 2 – Medium , 1 – Weak | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **COs** | **Programme Outcomes (POs)** | | | | | | | | | | | | | |
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| **CO1** | 3 | 3 | 3 | 3 | 3 | - | - | - | 3 | - | - | 3 | 3 | 3 |
| **CO2** | 3 | 3 | 3 | 3 | 3 | - | - | - | 3 | - | - | 3 | 3 | 3 |
| **CO3** | 3 | 3 | 3 | 3 | 3 | - | - | - | 3 | - | - | 3 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 3 | 3 | - | - | - | 3 | - | - | 3 | 3 | 3 |

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**EC20305** **DIGITAL ELECTRONICS LABORATORY** **0 0 4 2**

## COURSE OBJECTIVES

To enable the students to

- design and implement adders,subtractors and code converters.
- analyse the operation of various combinational logic circuits like MUX,DEMUX, Encoder, Decoder.
- apply flip flop concepts in designing registers and counters.
- write Verilog HDL code for digital circuits.

## LIST OF EXPERIMENTS

1. Design and implementation of Adders and Subtractors using logic gates.
2. Design and implementation of Code converters using logic gates.
   i. BCD to excess-3 code converters and vice versa.
   ii. Binary to gray code converters and vice-versa.
3. Design and implementation of 4 bit binary Adder/ Subtractor and BCD adder using IC 7483.
4. Design and implementation of 2 Bit Magnitude Comparator using logic gates.
5. Design and implementation of Multiplexer and De-multiplexer .
6. Design and implementation of Encoder and decoder.
7. Construction and verification of 4-bit Ripple counter.
8. Construction and verification of Mod-N counters.
9. Design and implementation of 4-bit synchronous up and down counter.
10. Implementation of 4-bit shift registers using Flip flops. (SISO, SIPO, PISO, PIPO).
11. Design and Simulation of Full and Half Adders, Full and Half Subtractors, Multiplexer and De-multiplexer, Encoder and Decoder using Verilog HDL.

**TOTAL PERIODS 60**

## COURSE OUTCOMES

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

- design adders, subtractors and code converters using basic logic gates and Karnaugh map.
- analyze different combinational logic circuits like MUX,DEMUX, Encoder, Decoder etc.
- design various counters and shift registers in digital circuits.
- simulate digital circuits with Verilog HDL.

**CO-PO MAPPING :**

| Mapping of Course Outcomes with Programme Outcomes : (1,2,3 indicates the strength of correlation) 3 – Strong , 2 – Medium , 1 – Weak | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **COs** | **Programme Outcomes (POs)** | | | | | | | | | | | | | |
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| **CO1** | 3 | 3 | 3 | 2 | - | - | - | - | 2 | - | - | 3 | 3 | 3 |
| **CO2** | 3 | 3 | 3 | 2 | - | - | - | - | 2 | - | - | - | 3 | 3 |
| **CO3** | 3 | 3 | 3 | - | - | - | - | - | - | - | - | - | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 2 | 3 | - | - | - | - | - | - | 3 | 3 | 3 |

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| IT20307 | FUNDAMENTALS OF DATA STRUCTURES IN C LABORATORY | 0 | 0 | 4 | 2 |
|---|---|---|---|---|---|

## COURSE OBJECTIVES

To enable students to

- understand and implement basic data structures using C
- familiarize with the advanced features of C language.
- apply linear and non-linear data structures in problem solving.
- implement searching and sorting algorithms.

## LIST OF EXPERIMENTS

1. Basic C Programs - looping, arrays.
2. Programs using strings - string function implementation.
3. Programs using structures and pointers.
4. Programs involving dynamic memory allocations.
5. Implementation of Stack using Arrays and Linked List.
6. Implementation of Queue using Arrays and Linked List.
7. Implementation of Stack and Queue applications.
8. Implementation of Binary Search Tree.
9. Implementing of BFS and DFS algorithms.
10. Implementation any application using Linear Search.
11. Implementation any application using Binary Search.
12. Implementation of Insertion Sort, Bubble Sort.
13. Implementation of Quick Sort, Merge Sort.

**TOTAL PERIODS 60**

## COURSE OUTCOMES

At the end this course, the students will be able to

- develop C programs for any real world/technical situations.
- apply advanced features of C in solving problems.
- write code using linear and non-linear data structure operations.
- implement various sorting and searching techniques.

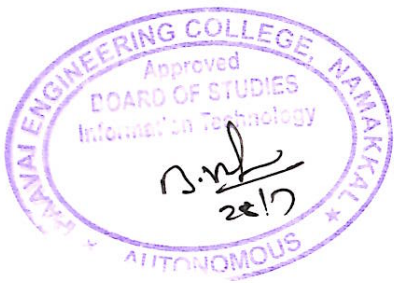
**RECOMMENDED SYSTEM/SOFTWARE REQUIREMENTS**

**Software:** Turbo C.

**Hardware:** Flavor of any WINDOWS or LINUX and Standalone desktops 60 Nos.

**CO-PO MAPPING:**

| Mapping of Course Outcomes with Programme Outcomes (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **COs** | **Programme Outcomes (POs)** | | | | | | | | | | | | | |
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| **CO1** | 2 | 2 | 3 | 2 | 2 | - | - | - | - | - | 3 | 2 | 2 | 2 |
| **CO2** | 2 | 2 | 3 | 2 | 3 | - | - | - | - | - | 3 | 2 | 2 | 3 |
| **CO3** | 2 | 2 | 3 | 2 | 3 | - | - | - | - | | 2 | 2 | 3 | 2 |
| **CO4** | 2 | 2 | 3 | 2 | 2 | - | - | - | - | - | 2 | 3 | 2 | 3 |



MA20402 **PROBABILITY AND RANDOM PROCESSES** 3 1 0 4

**OBJECTIVES**

To enable the students to

- analyse the concept of probability
- understand the concepts of standard distribution methods.
- learn the two-dimensional random variable, correlation and regression
- provide insight into the classification of random process and Markov process
- correlate the function and properties of linear time invariant system.

**UNIT I RANDOM VARIABLES** **12**

Axioms of probability - Conditional probability - Total probability - Baye's theorem - Random variable- Probability mass function - Probability density function - Properties - Moments - Moment generating functions and their properties.

**UNIT II STANDARD DISTRIBUTION** **12**

Binomial, Poisson, Geometric, Uniform, Exponential and Normal distribution and their properties.

**UNIT III TWO DIMENSIONAL RANDOM VARIABLES** **12**

Functions of a random variable - Joint distributions - Marginal and conditional distributions - Covariance - Correlation and Linear regression - Transformation of random variables.

**UNIT IV RANDOM PROCESS AND MARKOV PROCESS** **12**

Classification - Stationary process (WSS, SSS) - Poisson process - Markov Process - Transition probabilities - Markov Chains - Limiting Distributions.

**UNIT V CORRELATION AND SPECTRAL DENSITIES** **12**

Auto correlation functions - Cross correlation functions - Properties - Power spectral density - Cross spectral density - Properties. Linear time invariant system - System transfer function - Linear systems with random inputs - Autocorrelation and Cross correlation functions of input and output.

**TOTAL PERIODS: 60**

## OUTCOMES

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

- demonstrate and apply the basic probability axioms and concept in the core areas of random phenomena
- analyse and interpret practical solutions and fit a suitable probability distribution
- apply effectively the concept of two dimensional random variables
- handle random process techniques in solving real life engineering specialization.
- analyze the response of random inputs to linear time invariant systems.

## TEXT BOOKS


1. T. Veerarajan, Probability, Statistics and Random Processes‖, 2nd ed., Tata McGraw- Hill, New Delhi, 2008.
2. Ibe. O.C., "Fundamentals of Applied Probability and Random Processes", Elsevier, 2nd Indian Reprint, 2010
3. Peebles. P.Z., Probability, Random Variables and Random Signal Principles‖, Tata Mc Graw Hill, 4th Edition, New Delhi, 2008.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2. Cooper. G.R., Mc Gillem. C.D., —Probabilistic Methods of Signal and System Analysis, 3rd Indian Edition, Oxford University Press, New Delhi, 2012.
3. Hsu and Hwei, —Schaum's Outline of Theory and Problems of Probability, Random variables and Random Processes, Tata McGraw – Hill, New Delhi, 2008.
4. Leon-Garcia, Albert, —Probability and Random Processes for Electrical Engineering, 2nd ed., Pearson Education, 2008.
5. Venkatachalam G, Probability and Random Process, Hitech Publishing Company Pvt. Ltd., Chennai, 3rd Edition, 2012.


**Mapping of Course Outcomes with Programme Outcomes**

**(1/2/3 indicates strength of correlation) 3-strong, 2-Medium, 1-Weak**

| COs | Programme Outcomes(POs) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
| CO1 | 3 | 3 | 2 | 3 | - | - | - | - | - | - | - | - | 3 | 3 |
| CO2 | 3 | 3 | 3 | 2 | - | - | - | - | - | - | - | - | 3 | 3 |
| CO3 | 3 | 3 | 3 | - | - | - | - | - | - | - | - | - | 3 | 3 |
| CO4 | 3 | 3 | 2 | 3 | - | - | - | - | - | - | - | - | 3 | 3 |
| CO5 | 3 | 3 | 2 | - | - | - | - | - | - | - | - | - | 3 | 3 |

**EC20401** **CONTROL SYSTEMS** **3 0 0 3**

**COURSE OBJECTIVES**

To enable the students to

- gain knowledge on system modelling.
- understand the concept of time response analysis of control systems.
- acquire knowledge about frequency response analysis using various plots.
- adopt different methods to analyze the stability of control systems.
- know the concept of state variable analysis in control systems.

**UNIT I CONTROL SYSTEM MODELLING** **9**

Basic Elements of Control System - Open loop, Closed loop systems; Transfer function concept- Modelling of Electric systems, Translational and rotational mechanical systems, Block Diagram reduction Techniques; Signal flow graph - Conversion of Block diagram, Mason's gain formula.

**UNIT II TIME RESPONSE ANALYSIS** **9**

Standard Test Signals; Time response analysis - First Order Systems - Impulse , Step, Ramp Response; Analysis of second order systems; Steady state errors , generalised errors ; Compensation techniques - P, PI, PD,PID controllers.

**UNIT III FREQUENCY RESPONSE ANALYSIS** **9**

Frequency Response - Bode Plot, Polar Plot, Nyquist plot, M and N circles; Frequency Domain specifications from the plots - Gain margin, Phase margin assessment; Compensators - Lag, Lead, Lag - Lead.

**UNIT IV STABILITY ANALYSIS** **9**

Stability - Location of roots in S plane for stability, Routh-Hurwitz Criterion, Nyquist stability criterion; Root Locus Technique - Construction of Root Locus.

**UNIT V STATE VARIABLE ANALYSIS** **9**

Concepts of State, State variable and state model - State space representation using physical, phase and canonical variables; State transition matrix - Solution of state equations, Concepts of Controllability and Observability.

**TOTAL PERIODS 45**

## COURSE OUTCOMES

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

- determine the models of control systems and their representation.
- design a control system using time response analysis.
- analyze the various frequency response plots.
- test the stability of a system using various techniques.
- compute the state space analysis of control systems.

## TEXT BOOKS


1. J.Nagrath and M.Gopal, "Control System Engineering", New Age International Publishers, 5th Edition, 2007.
2. Norman S.Nise,"Control Systems Engineering",Wiley Publishers,8th Edition, 2019


## REFERENCES


1. Benjamin.C.Kuo, "Automatic control systems", Prentice Hall of India, 7th Edition,1995.
2. M.Gopal, "Control System - Principles and Design", Tata McGraw Hill, 2nd Edition, 2002.
3. Schaum's Outline Series, "Feedback and Control Systems", Tata McGraw-Hill, 2007.
4. John J.D'azzo & Constantine H.Houpis, "Linear control system analysis and design", Tata McGraw-Hill Inc., 1995.


**CO-PO MAPPING :**

| Mapping of Course Outcomes with Programme Outcomes : (1,2,3 indicates the strength of correlation) 3 – Strong , 2 – Medium , 1 – Weak | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **COs** | **Programme Outcomes (POs)** | | | | | | | | | | | | | |
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| **CO1** | 3 | 3 | 3 | 2 | - | - | - | - | - | - | - | 2 | 3 | 3 |
| **CO2** | 3 | 3 | 3 | 2 | - | - | - | - | - | - | - | 2 | 3 | 3 |
| **CO3** | 3 | 3 | 3 | - | - | - | - | - | - | - | - | 2 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 2 | - | - | - | - | - | - | - | 2 | 3 | 3 |
| **CO5** | 3 | 3 | 3 | 2 | - | - | - | - | - | - | - | 3 | 3 | 3 |

**EC20402** **SIGNALS AND SYSTEMS** **3 1 0 4**

**COURSE OBJECTIVES**

To enable the students to

- understand the rudimentary concepts of continuous time and discrete time signals and systems.
- gain knowledge in signals and systems utilizing different transforms.
- know about the analysis and realization of LTI-Continuous Time systems.
- acquire the fundamental cognizance in Sampling and Z transform.
- analyze and realize the LTI-Discrete Time systems.

**UNIT I CLASSIFICATION OF SIGNALS AND SYSTEMS** **12**

Continuous time signals - Discrete time signals - step, ramp, pulse, impulse,parabola,signum,sine,sinc, exponential; Operation on signals; Classification of CT and DT signals - periodic, aperiodic signals, Energy, Power signals, Even, odd ; CT systems and DT systems - Properties ; LTI system - Properties; Convolution Integral; Convolution sum.

**UNIT II ANALYSIS OF CONTINUOUS TIME SIGNALS** **12**

Fourier series - definition, properties,analysis; Fourier transform - definition, properties, analysis; Laplace Transform - definition, ROC, properties ,Unilateral Laplace Transform,Bilateral Laplace transform.

**UNIT III LINEAR TIME INVARIANT- CONTINUOUS TIME SYSTEMS** **12**

Differential Equations - impulse response, Step response, output response ; Block diagram representation - Direct Form I , Direct Form II , Cascade , Parallel realisation.

**UNIT IV ANALYSIS OF DISCRETE TIME SIGNALS** **12**

Sampling Theorem - Reconstruction, Aliasing; DTFT - properties; Z transform - Region of Convergence, Properties of ROC, Properties of Z transform, Inverse Z transform using Partial fraction method.

**UNIT V LINEAR TIME INVARIANT- DISCRETE TIME SYSTEMS** **12**

Solution of Difference Equations using Z transform ; Block diagram representation - Direct Form I - Direct Form II, Cascade , Parallel realisation.

**TOTAL PERIODS** **60**

**COURSE OUTCOMES**

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

- analyze the basic concepts of solving problems in continuous time, discrete time signals and systems.

- apply transform techniques to analyze continuous-time signals and systems.
- examine problems and give solutions relating to LTI- continuous time systems.
- apply the knowledge of Sampling and Z transform in real time applications.
- develop competence in the analysis of LTI- discrete time systems.

**TEXT BOOKS**

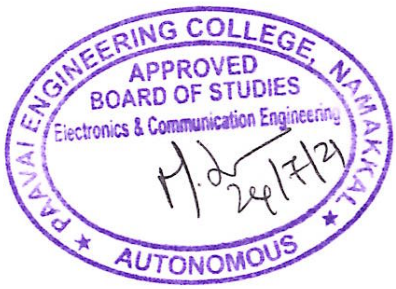

1. Alan V. Oppenheim, Alan S. Willsky, S. Hamid Nawab, "Signals and Systems", 2nd edition, Prentice Hall India, 2010.
2. B. P. Lathi, "Principles of Linear Systems and Signals", Oxford, 2nd Edition, 2009.


**REFERENCES**


1. A. NagoorKani, "Signals & Systems", Tata McGraw Hill, 2010.
2. R.F. Ziemer, W.H. Tranter and D.R. Fannin, "Signals and Systems - Continuous and Discrete", 4th edition, Prentice Hall, 1998.
3. H P Hsu, Rakesh Ranjan, "Signals and Systems", Schaum's Outlines, Tata McGraw Hill, Indian Reprint 2007.
4. John Alan Stuller, "An Introduction to Signals and Systems", Thomson, 2007.


**CO-PO MAPPING :**

| **Mapping of Course Outcomes with Programme Outcomes :**<br>**(1,2,3 indicates the strength of correlation) 3 – Strong , 2 – Medium , 1 – Weak** | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **COs** | **Programme Outcomes (POs)** | | | | | | | | | | | | | |
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| **CO1** | 3 | 2 | - | 1 | - | - | - | - | - | - | - | 2 | 3 | 3 |
| **CO2** | 3 | 3 | - | 2 | - | - | - | - | - | - | - | 3 | 3 | 3 |
| **CO3** | 3 | 3 | 1 | 2 | - | - | - | - | - | - | - | 3 | 3 | 3 |
| **CO4** | 3 | 3 | - | 1 | - | - | - | - | - | - | - | 2 | 3 | 3 |
| **CO5** | 3 | 3 | 1 | 2 | - | - | - | - | - | - | - | 2 | 3 | 3 |



**EC20403** **ANALOG INTEGRATED CIRCUITS** **3 0 0 3**

**COURSE OBJECTIVES**

To enable the students to

- understand IC fabrication process and basics of operational amplifier.
- know linear and nonlinear applications of operational amplifier.
- be familiar with the operation and applications of PLL and active filter.
- know the concepts of data converters.
- acquire the basic knowledge about special function IC's.

**UNIT I INTEGRATED CIRCUIT FABRICATION AND OPERATIONAL AMPLIFIER** **9**

Manfacturing process of monolithic IC - Operational amplifier - Basic information of Op-Amps, Ideal and Practical Op-Amp Characteristics, General operational amplifier stages, Open and closed loop configurations, DC, AC Characteristics of Op-Amp ; Frequency compensation ; Slew rate; Recent trends in IC technology.

**UNIT II APPLICATIONS OF OPERATIONAL AMPLIFIERS** **9**

Inverting and Non-inverting voltage amplifiers - sign changer, scale changer; voltage follower; adder and subtractor; Instrumentation amplifier; Voltage to Current, Current to Voltage converter; Logarithmic amplifier, Anti-logarithmic amplifiers; Differentiator; Integrator; Comparator; Schmitt trigger; Precision Rectifiers.

**UNITIII PHASE LOCKED LOOP AND ACTIVE FILTERS** **9**

Phase Locked Loop (PLL) - Basic principles, Phase Detector/Comparator; Voltage controlled Oscillator; Monolithic PLL - PLL applications; Active filters - Design of Low pass, high pass, band pass filters.

**UNIT IV DATA CONVERTERS** **9**

Digital to Analog Converters - DAC Specifications, Binary weighted resistor type, R-2R ladder type; sample and hold circuits; Analog-to-Digital Converters - ADC Specifications, Flash type ADC, Counter type ADC, Successive approximation register type ADC, Dual slope ADC.

**UNIT V SPECIAL FUNCTION INTEGRATED CIRCUITS** **9**

Wave Generators - Sine, Square, Triangle, Saw-tooth Wave; IC741; Astable and monostable multivibrators; IC 555 timer - description, functional diagram, Astable, Monostable operation; Voltage regulator using IC723, LM317.

**TOTAL PERIODS** **45**

## COURSE OUTCOMES

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

- analyze the characteristics of operational amplifier.
- design various applications using operational amplifier.
- develop and analyze PLL and filter applications.
- built data converting circuits of given specifications.
- design and operate special function IC's for real time applications.

## TEXT BOOKS


1. D.Roy Choudhry, Shail Jain, "Linear Integrated Circuits", New Age International Pvt. Ltd., Fourth edition 2010.
2. Sergio Franco, "Design with operational amplifiers and analog integrated circuits", McGraw Hill, 3rd edition 2007.


## REFERENCES

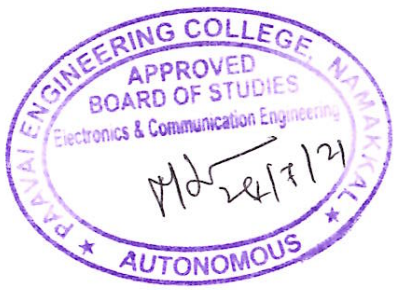

1. William D.Stanely, "Operational Amplifiers with Linear Integrated Circuits", Pearson Education, 2004.
2. David L.Terrell, "Op Amps-Design, Application, and Troubleshooting", Elsevier publications 2005.
3. Ramakant A. Gayakwad, "OP - AMP and Linear IC's", Prentice Hall, 1994.
4. Botkar K.R., "Integrated Circuits", Khanna Publishers, 1996.


## CO-PO MAPPING :

**Mapping of Course Outcomes with Programme Outcomes :**

**(1,2,3 indicates the strength of correlation) 3 – Strong , 2 – Medium , 1 – Weak**

| COs | Programme Outcomes (POs) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
| CO1 | 3 | 2 | 2 | 2 | - | - | - | - | - | - | - | - | 3 | 3 |
| CO2 | 3 | 3 | 3 | 3 | - | - | - | - | - | - | - | - | 3 | 3 |
| CO3 | 3 | 3 | 3 | - | - | - | - | - | - | - | - | - | 3 | 3 |
| CO4 | 3 | 3 | 3 | 3 | - | - | - | - | - | - | - | - | 3 | 3 |
| CO5 | 3 | 2 | 2 | - | - | - | - | - | - | - | - | - | 3 | 3 |



**EC20404** **MICROPROCESSORS AND MICROCONTROLLERS** **3 0 0 3**

**COURSE OBJECTIVES**

To enable the students to

- understand the architecture and programming of 8085 and 8086 microprocessor.
- acquire knowledge about bus structures and various configurations of 8086 microprocessor.
- learn the design aspects of I/O and memory interfacing circuits
- study the architecture of 8051 microcontroller.
- design a microcontroller-based system.

**UNIT I 8085 AND 8086 MICROPROCESSORS** **9**

8085 Microprocessor - Architecture, Instruction set, addressing modes, Assembly language programming; 8086 Microprocessor - Architecture, addressing modes, Instruction set, assembler directives, Assembly language programming.

**UNIT II 8086 SYSTEM BUS STRUCTURE** **9**

8086 signals - Basic configuration, System bus timing; System design using 8086 I/O programming; Introduction to Multiprogramming - System Bus Structure, Multiprocessor configurations - Coprocessor, closely coupled and loosely Coupled configurations - Introduction to advanced processors.

**UNIT III I/O INTERFACING** **9**

Memory Interfacing and I/O interfacing - Parallel communication interface, Serial communication interface, D/A and A/D Interface; Timer; Keyboard/display controller, Interrupt controller, DMA controller; Programming and applications; Case studies -Traffic Light control, LED display, LCD display, Keyboard display interface, Alarm Controller.

**UNIT IV MICROCONTROLLERS** **9**

Comparison of microprocessor and microcontroller; 8051 - Architecture, Special Function Registers (SFRs), I/O Ports and circuits, Instruction set, Addressing modes, Assembly language programming. PIC and ARM processors.

**UNIT V INTERFACING MICROCONTROLLER** **9**

Interfacing 8051 - Timers, Serial Port, Interrupts, LCD, Keyboard/Display controller, ADC, DAC, Sensor Interfacing, Stepper Motor controller and Waveform generator.

**TOTAL PERIODS 45**

## COURSE OUTCOMES

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

- infer the operations of 8085 and 8086 microprocessor architecture.
- execute programs based on 8086 microprocessor.
- interface I/O circuits for real time applications.
- analyse different microcontroller operations.
- design and implement 8051 microcontroller-based systems.

## TEXT BOOKS

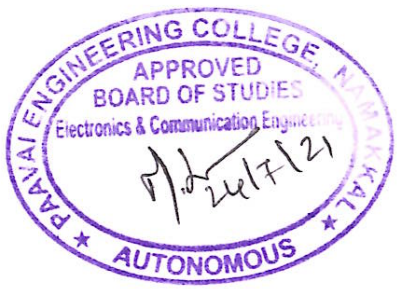

1. Yu-Cheng Liu, Glenn A. Gibson, "Microcomputer Systems: The 8086 / 8088 Family - Architecture, Programming and Design", Second Edition, Prentice Hall of India, 2007.
2. Mohamed Ali Mazidi, Janice Gillispie Mazidi, Rolin McKinlay," The 8051 Microcontroller and Embedded Systems: Using Assembly and C", Second Edition, Pearson education, 2011.


## REFERENCES


1. Ramesh S. Gaonkar, "Microprocessor Architecture, Programming and Applications with 8085". Penram International Publishing reprint, 6th Edition, 2017.
2. Krishna Kant, Microprocessor and Microcontroller Architecture, programming and system design using 8085, 8086, 8051 and 8096, PHI, 2007, Seventh Reprint, 2011.
3. DoughlasV.Hall, "Microprocessors and Interfacing, Programming and Hardware", TMH, 2012.
4. Kenneth J. Ayala., The 8051 Microcontroller, 3rd Edition, Thompson Delmar Learning, 2012.


## CO-PO MAPPING :

| Mapping of Course Outcomes with Programme Outcomes : (1,2,3 indicates the strength of correlation) 3 – Strong , 2 – Medium , 1 – Weak | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **COs** | **Programme Outcomes (POs)** | | | | | | | | | | | | |
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| **CO1** | 3 | 2 | 2 | 2 | 2 | - | - | - | - | - | - | - | 3 | 3 |
| **CO2** | 3 | 2 | 2 | 2 | 2 | - | - | - | - | - | - | - | 3 | 3 |
| **CO3** | 3 | 2 | 2 | 2 | 2 | 2 | 2 | - | - | - | - | - | 3 | 3 |
| **CO4** | 3 | 2 | 2 | 2 | 2 | - | - | - | - | - | - | - | 3 | 3 |
| **CO5** | 3 | 2 | 2 | 2 | 2 | 2 | 2 | - | - | - | - | - | 3 | 3 |



**EC20405 ANALOG INTEGRATED CIRCUITS LABORATORY 0 0 4 2**

**COURSE OBJECTIVES**

To enable the students to

- understand the applications of operational amplifier.
- analyze the working of multivibrators using operational amplifier and 555 timers.
- design oscillators and active filters for various applications.
- simulate the Op-Amp application circuits using MULTISIM software.

**LIST OF EXPERIMENTS**

1. Inverting, Non inverting amplifier and differential amplifier.
2. Instrumentation amplifier.
3. Integrator and Differentiator.
4. Active low pass, High pass and band pass filters.
5. Comparator and Schmitt trigger.
6. Astable, Monostable Multivibrators (using IC 741).
7. Phase shift Oscillator and Wien bridge oscillators (using IC 741).
8. Astable and monostable Multivibrators using NE555 Timer.
9. IC723 and LM317 regulators
10. Phase Locked Loop application.

**Simulation Experiments**

11. Simulation of (i) Instrumentation amplifier, (ii) Integrator and Differentiator, (iii) Active low pass, High pass and band pass filters, (iv) Astable, Monostable Multivibrators and Schmitt trigger (using IC 741), (v) Phase shift Oscillator and Wien bridge oscillators (using IC 741), (vi) Astable and Monostable Multivibrators using NE555 Timer using MULTISIM.

**TOTAL PERIODS 60**

**COURSE OUTCOMES**

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

- design and test the Op-amp applications.
- develop and analyze op-amp filters.
- design oscillators and multivibrators for various applications.
- analyze the working of voltage regulators.

**CO-PO MAPPING :**

| Mapping of Course Outcomes with Programme Outcomes : (1,2,3 indicates the strength of correlation) 3 – Strong , 2 – Medium , 1 – Weak | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **COs** | **Programme Outcomes (POs)** | | | | | | | | | | | | | |
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| **CO1** | 3 | 3 | 3 | 3 | - | - | - | - | - | - | - | - | 3 | 2 |
| **CO2** | 3 | 3 | 3 | 3 | - | - | - | - | - | - | - | - | 3 | 2 |
| **CO3** | 3 | 3 | 3 | - | - | - | - | - | - | - | - | - | 3 | 2 |
| **CO4** | 3 | 3 | 3 | 3 | - | - | - | - | - | - | - | - | 3 | 2 |

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**EC20406 MICROPROCESSORS AND MICROCONTROLLERS LABORATORY** **0 0 4 2**

**COURSE OBJECTIVES**

To enable the students to

- implement the assembly language programming of 8085,8086 and 8051.
- experiment the interface concepts of various peripheral devices with the processor.
- understand the basic idea about the data transfer schemes and its applications.
- develop programming skills using MASM.

**Assembly Language programming using 8085 Microprocessor**

1. Arithmetic operations
2. Code Conversion

**Assembly Language programming using 8086 Microprocessor and MASM**

1. Basic arithmetic and Logical operations.
2. Move a data block without overlap.
3. String manipulations
4. Sorting and searching

**Interfacing with 8086 Microprocessor**

1. Stepper motor control
2. Key board and Display
3. Serial interface
4. Parallel interface

**Programming using 8051 Microcontroller**

1. Basic arithmetic and Logical operations
2. ADC and DAC interfacing.
3. Traffic Light controller

**TOTAL PERIODS 60**

**COURSE OUTCOMES:**

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

- write assembly language programs for various applications.
- interface different peripherals with microprocessor
- execute programs in 8086 and 8051
- simulate programs in MASM.

**CO-PO MAPPING :**

| Mapping of Course Outcomes with Programme Outcomes :<br>(1,2,3 indicates the strength of correlation) 3 – Strong , 2 – Medium , 1 – Weak | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **COs** | **Programme Outcomes (POs)** | | | | | | | | | | | | | |
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| **CO1** | 3 | 2 | 2 | 2 | 2 | 2 | - | - | 1 | - | - | 2 | 2 | 2 |
| **CO2** | 3 | 2 | 2 | 2 | 2 | 2 | - | - | 1 | - | - | 2 | 2 | 2 |
| **CO3** | 3 | 2 | 2 | 2 | 2 | 2 | - | - | 1 | - | - | 2 | 2 | 2 |
| **CO4** | 3 | 2 | 2 | 2 | 2 | 2 | - | - | 1 | - | - | 2 | 2 | 2 |

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**EN20401** **ENGLISH PROFICIENCY COURSE LABORATORY** **0 0 2 1**

**COURSE OBJECTIVES**

To enable the students to

- familiarize with the reading skills such as skimming and scanning.
- practise writing tasks to the level expected.
- develop listening strategies such as listening for key words, making inferences and identifying main ideas.
- speak well without inhibition and to assist the students in improving their vocabulary, pronunciation and comprehension of grammar.

**EXERCISES FOR PRACTICE**

1. Listening Exercises from TOEFL
    a. Conversations, Lectures
2. Listening Exercises from IELTS
    a. Places and directions
    b. Actions and processes
3. Reading Exercises from PTE
    a. Re-order paragraphs
4. Reading Exercises from IELTS
    a. Opinions and attitudes
    b. Locating and matching information
    c. Identifying information
5. Reading Exercises from BEC Vantage & BEC Higher
    a. Error identification
    b. Gap filling
6. Writing Exercises from PTE
    a. Summarize written text
7. Writing Exercises from IELTS
    a. Describing maps
    b. Describing diagrams
8. Speaking IELTS format
    a. Talking about familiar topics
    b. Giving a talk
    c. Discussion on a Topic

**TOTAL PERIODS 30**

## COURSE OUTCOMES

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

- skim, scan and infer the given texts and attend the tasks successfully.
- write coherently using appropriate vocabulary and grammar.
- listen to speeches and conversations and answer the questions.
- communicate fluently and effectively on any given topic and appear with confidence for on-line tests.

## TEXT BOOKS

1. Cambridge IELTS 12 Academic Student's Book with Answers: Authentic Examination Papers
2. TOEFL iBT Prep Plus 2018-2019 4 Practice Tests) Kaplan Publishing. Newyork.2017.

## REFERENCES

1. Cambridge University Press India Pvt. Ltd, New Delhi.2016.
2. PTE Academic Test builder. Macmillan Education. London. 2012.

**CO-PO MAPPING :**

| Mapping of Course Outcomes with Programme Outcomes : (1,2,3 indicates the strength of correlation) 3 – Strong , 2 – Medium , 1 – Weak | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **COs** | **Programme Outcomes (POs)** | | | | | | | | | | | | | |
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| **CO1** | - | - | - | 2 | 3 | - | - | - | 3 | 2 | - | - | - | - |
| **CO2** | - | - | 2 | 2 | - | - | 1 | 1 | 3 | 2 | - | 2 | - | - |
| **CO3** | - | - | - | - | - | 3 | 1 | 2 | 3 | 2 | 2 | 3 | - | - |
| **CO4** | - | - | 2 | - | - | 2 | 2 | 3 | 3 | 2 | 2 | 1 | - | - |