

**20EES01: Basics of MATLAB****Credits - 2****Sessional Marks: 40****L: T: P:: 0:1:2****University Exam Marks: 60**

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**Course Objectives:**

1. To know about fundamentals of MATLAB tool .
2. To provide an overview to program curve fitting & solve Linear and Nonlinear Equations.
3. To understand the concept and importance of Fourier transforms.
4. To gain knowledge about MATLAB Simulink & solve Electrical engineering problems.

**Course Outcomes:**

- CO1: Able to implement loops, branching, control instruction and functions in MATLAB programming environment.
- CO2: Able to program curve fitting, numerical differentiation and integration, solution of linear equations in MATLAB and solve electrical engineering problems.
- CO3: Able to understand implementation of ODE using ode 45 and execute Solutions of nonlinear equations and DFT in MATLAB.
- CO4: Able to simulate MATLAB Simulink examples

**SYLLABUS:**

**Introduction to MATLAB Programming:** Basics of MATLAB Programming, array operations in MATLAB, loops and execution of control, working with files: Scripts and functions, plotting and programming output, examples.

**Numerical Methods and their applications: Curve Fitting: Straight line fit, Polynomial fit.**

**Numerical Integration and Differentiation:** Trapezoidal method, Simpson method.

**Linear and Nonlinear Equations:** Eigen values, Eigen vectors, Solution of linear algebraic equations using Gauss Elimination and LU decomposition, Solution of nonlinear equation in single variable using Gauss siedal and Newton-Raphson method.

**Ordinary Differential Equations:** Introduction to ODE's, Euler's method, second order RungeKutta method, MATLAB ode45 algorithm in single variable and multivariables.

**Transforms:** Discrete Fourier Transforms,

**Applications to electrical engineering problems.**

**MATLAB Simulink:** Introduction to MATLAB Simulink, Simulink libraries, development of basic models in Simscape Power Systems.

**Text Books:**

1. Agam Kumar Tyagi, “**MATLAB and Simulink for Engineers**”, OXFORD Higher Education.
2. Dr. Shailendra Jain, “**Modeling& Simulation using MATLAB – Simulink**”, Wiley – India.

**Reference Books:**

1. Won Y.Tang, Wemun Cao, Tae-Sang Ching and John Morris, “**Applied Numerical Methods Using MATLAB**”, A John Wiley & Sons.
2. Steven T. Karris, “**Introduction to Simulink with Engineering Applications**”, Orchard Publications.

**Course Outcome-Program Outcome- Program Specific Outcomes (CO-PO-PSO) Mapping:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	H	-	M	-	-	-	-	-	-	-	H	M	-
CO2	-	H	M	-	-	-	-	-	-	-	-	-	-	H	-
CO3	-	-	-	M	H	-	-	-	-	-	-	-	-	H	-
CO4	-	-	H	-	M	-	-	-	-	-	-	-	-	H	-

**20BSS01 EFFECTIVE COMMUNICATION SKILLS****Credits - 2****Sessional Marks:40****L:T:P::0:1:2****University Exam Marks:60**

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**Course Objectives**

- To enhance speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations
- To write well structured paragraphs on specific topics.
- To improve the fluency in spoken English and neutralize mother tongue influence.
- To train students to use language appropriately for interview skills, group discussion and public speaking

**Course Outcomes**

- Understand verbal and non-verbal communication and become efficient in formal/informal conversations
- Applying presentation & Interview skills for their personal and professional growth.
- Implementing skills and master their Interpersonal skills.
- Transmitting the abilities of Debates and Group discussion for better performance in professional life.

**UNIT- I****Introduction to Communication Skills**

- Introducing oneself - Introducing others – Greetings
- Role play/Situational Dialogues
- Just A Minute (JAM)

**UNIT – II****Soft Skills**

- Intrapersonal Skills :  
Time Management, Positive Thinking & Goal Setting
- Interpersonal Skills :  
Leadership Skills, Team Building & Crisis Management

**UNIT – III****Writing Skills**

- Technical Report Writing
- Resume Writing
- Email Writing

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**UNIT – IV****Presentation Skills**

- Oral Presentations
- Power Point Presentation
- Non- verbal Communication Skills

**UNIT – V****Career Skills**

- Group Discussions
- Debates
- Interview Skills
- FAQs & Quick tips

**REFERENCE BOOKS:**

1. Soft Skills, revised 2<sup>nd</sup> edition, K.Alex, S.Chand &Company, New Delhi.2014.
2. Effective Technical Communication | 2nd Edition Paperback,M Ashraf Rizvi, McGraw Hill Education. 2017.
3. Speaking English Effectively, 2<sup>nd</sup> Edition Krishna Mohan & NP Singh, 2011. (Mcmillan).
4. A Hand book for English language skills, E.Suresh kumar, P.Sreehari, Foundation Books,2011
5. Basics of Communication in English, Soundararaj, Francis. 2012.. *New Delhi: Macmillan*
6. Spoken English (CIEFL) in 3 volumes with 6 cassettes, OUP.

**Course Outcomes – Program Outcomes (CO-PO) Mapping**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		H								M		L
CO2			L	M		H						M
CO3									M	H		M
CO4				M						H		M

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**20EES02: Electrical Safety****Credits - 2****Sessional Marks: 40****L: T: P:: 0:1:2****University Exam Marks: 60**

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**Course Objectives:**

1. Apply standard safety procedures in an industrial environment.
2. Understand the purpose and scope of the Standards and Electrical Codes to be followed.
3. Recognize the standard workplace hazards, warning signs and labels.

**Expected Course Outcome:**

1. Design and Conduct experiments, as well as analyze and interpret data

**List of Experiments**

1. Study of Various types of protection devices
  - a. Fuses
  - b. MCB
  - c. ELCB
2. Study of Various types of Earthing
  - a. Sizing of Earth stripping for Earthing arrangement
  - b. Sizing of pipe Earthing and plate Earthing as per IS 3043 standard for Earthing arrangement.
3. Introduction of Electrical safety precautions
  - a. Rubber Mat
  - b. Electrical Gloves specification
4. Verification of operation of power supply tester.
5. Sizing of Neutral Link.
6. Insulation resistance for Motors
7. Insulation resistance for Cables
8. Measurement of Earth resistance
9. Earth continuity test
10. Sensitivity test for ELCB
11. Types, Procedure for operation, maintenance and application of fire extinguishers
12. Acceptance criteria for ohmic value of Earthing for various purpose
  - a. Industry
  - b. Domestic
  - c. Commercial
  - d. Laboratories

**Text Book(s) :**

1. S. Rao, and H.L. Saluja : Electrical Safety, Fire Engineering and Safety Management, Khanna Publishers, Delhi.

**Reference Books :**

1. H. Cotton : Electrical Technology, Wheeler Publishing Company.
2. S.L. Uppal : A Textbook of Electrical Engineering, Khanna Publishers, Delhi.
3. NSC, Chicago : Accident Prevention Manual for Industrial Operations
4. M.G. Say : Electrical Earthing and Accident prevention, Newnes, London, 1954.
5. John V Grimaldi and Rollin H Simonds., Safety Management Indian Electricity Act & Rules
6. Komamoto and Henley, Probabilistic Risk Assessment for Engineering and Scientists, IEEE Press, 1995.
7. Heinrich et al., Industrial Accident Prevention, McGraw Hill, 1980.
8. Petersen D, Techniques for safety management - A systems approach, ASSE 1998.

**Course Outcome-Program Outcome- Program Specific Outcomes (CO-PO-PSO) Mapping:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	-	-	-	-	H	-	-	-	-	-	-	M	-	-
CO2	M	-	-	-	-	H	-	-	-	-	-	-	M	-	-
CO3	M	-	-	-	-	H	-	-	-	-	-	-	M	-	-

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**20EES03: Electrical CAD****Credits - 2****Sessional Marks: 40****L: T: P:: 0:1:2****University Exam Marks: 60****Course Objectives:**

1. To understand the electrical CAD drawing tools and library.
2. To gain knowledge about component tools in the electrical CAD.
3. To Know about PLC and I/O module in the CAD.
4. To acquire knowledge about the way of connection in the CAD.

**Course Outcomes:****After completion of the course a successful student will be able to**

1. Apply electrical modules in a different method.
2. Analyze electrical networks and its performance using different component tools.
3. Analyze the electrical auditing tools, creating reports and Import/Export spreadsheet in the CAD
4. Create electrical networks using PLC and optimize the economic control

**UNIT 1**

**Introduction:** Introduction AutoCAD Electrical o GUI Project Introduction to Project Manager Working with Projects Drawing Adding a Drawing Create a new Drawing Properties Insert a Component Connecting a component. Create a Library Symbol Builder Circuit Builder of inserting a One-line Motor Circuit of inserting a Dual One-line Power Feed Circuit Copy circuitry Save circuit to icon menu.

**UNIT 2**

**Component Tools :** Inserting Components, Relocating Components , Inserting a Child Components , Aligning and Editing the Components Catalog Information, Component Tools , Inserting Components , Relocating Components , Inserting a Child Components , Aligning and Editing the Components , Catalog Information, Component Attribute Tools , Wires ,Wire layers , Wire types , Insert wire , Modify wire.

**UNIT 3**

**Signal Arrows :** Signal Arrows Source arrow o Destination arrow ,Ladder tools , Wire numbers , Automatic wire numbers o Wire tagging o PLC I/O wire numbers , Wire Number Edit,PLC , Generate PLC Layout Modules o PLC parametric selection , Module layout o Insert PLC modules , Edit PLC module o PLC Database File, Point to Point Wiring Tools.

**UNIT 4**

**Introduction to Connector Diagrams:** Introduction to Connector Diagrams o Inserting Connectors o Editing & Modifying Connectors o Link components by dashed lines , Grouping Wires, onversion tool , Convert text , Convert block , Convert wires , Convert arrows o Special Explode, Panel Layout o Foot Prints o Footprints from Schematic list , Footprints from icon menu , Din rails , Balloons , Wire Annotations , Create Assembly , Editing & Modifying Footprints.

**UNIT 5**

**Electrical Audit:** Missing Catalog Electrical Audit , Signal Error,/ List Drawing Audit, Generate Reports , Types of schematic reports , Generate a schematic report , Types of panel reports, Generate a panel report Run automatic reports , Automatic report generation , Import/Export , To Spreadsheet o From Spreadsheet, Project

**References:**

1. AutoCAD Electrical 2020 Black Book Paperback – Import, 11 September 2019  
by [Gaurav Verma](#) (Author), [Matt Weber](#) (Author)
- 2.AutoCAD Electrical 2021: A Tutorial Approach, 2nd Edition By: Prof. Sham Tickoo

**Course Outcome-Program Outcome- Program Specific Outcomes (CO-PO-PSO) Mapping:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	H	-	M	-	-	-	-	-	-	-	H	M	-
CO2	-	H	M	-	-	-	-	-	-	-	-	-	-	H	-
CO3	-	-	-	M	H	-	-	-	-	-	-	-	-	H	-
CO4	-	-	H	-	M	-	-	-	-	-	-	-	-	H	-

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**20EES04: PLC AND SCADA****Credits - 2****Sessional Marks: 40****L: T: P:: 0:1:2****University Exam Marks: 60****Course Objectives:**

1. To understand the fundamentals of PLC & SCADA.
2. To know about the process of Substation automation using PLC.
3. To implement PID Controllers and Logic Gates.
4. To understand the Operation of DOL Starter.
5. To gain knowledge about different timers and Counters

**Course Outcomes:**

After completion of the course student will be able to

CO1: Apply hardware and Software used in the PLC.

CO2.: Apply different timers and Counters.

CO3: Analyze process of Substation automation using PLC.

CO4: Analyze the implementation of PID Controllers and Logic Gates

CO5: Analyze the Operation of DOL Starter

**UNIT-1**

**PLC Fundamentals** : Digital Electronics Basics, PLC Fundamentals, PLC Hardware &Architecture Source &sink, Concepts Wiring Different field Devices to PLC Introduction to PLC Programming software Creating new application, addressing Programming Languages Basic Programming Instructions Advance Instructions Upload / Download /Monitoring Forcing of I/Os Fault finding / troubleshooting &documentation Communication with SCADA software.

**UNIT-2**

**Human Machine Interface:** Getting started with HMI, Creating applications, creating tags Downloading / uploading programs Communication with PLC Fault diagnostics /troubleshooting.

**UNIT-3**

**Introduction to SCADA:** Software creating new SCADA project Creating& editing elementary graphic display Attaching controls to graphic objects Real time & historical trends Using alarms &events.

**UNIT-4**

**SCADA Applications:** SCADA Applications of scripts Communication with PLC Communication with excel Fault finding /troubleshooting.

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**UNIT-5**

**Motion Control (Drives & Motors):** AC motors, operations & Limitations Motor Starters: DOL, Star-Delta, Auto Transformer Motor control circuits, interlocking circuits Introduction to AC drives & applications Criteria for drives selection designing of drive control panel Communication with PLC, SCADA Software Fault finding /troubleshooting

**LIST OF EXPERIMENTS/PROGRAMMES:**

1. Study hardware and software used in PLC.
2. Implementation Of PLC Arithmetic Instructions.
3. Development of 11KV/433 volts substation automation scheme using PLC for normal load operation.
4. Development of 11KV/433 volts substation automation scheme using PLC for timer ON/OFF load control.
5. Development of 11KV/433 volts substation automation scheme using PLC for cyclic ON/OFF load control.
6. Implementation of PID Controller.
7. Implementation of Logic Gates.
8. Implementation of DOL Starter.
9. Implementation of On-Delay Timer.
10. Implementation of Off-Delay Timer.
11. Implementation of Up-Down Counter

**References:**

1. PLC and SCADA Applications 2019 by [Anup Dakre](#)
2. Plcs & Scada - Theory and Practice by Vij Vikrant and Prof Rajesh Mishra

WEB REFERENCE: [vlab.co.in](http://vlab.co.in)

**Course Outcome-Program Outcome- Program Specific Outcomes (CO-PO-PSO) Mapping:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	H	-	M	-	-	-	-	-	-	-	H	M	-
CO2	-	H	M	-	-	-	-	-	-	-	-	-	-	H	-
CO3	-	-	-	M	H	-	-	-	-	-	-	-	-	H	-
CO4	-	-	H	-	M	-	-	-	-	-	-	-	-	H	-

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CO5	-	-	H	-	-	-	-	-	-	-	-	-	-	H	-
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## 20CSS11: ANIMATION FOR BEGINNERS

**Credits – 4**  
**L:T:P:: 3:1:0**

**Sessional Marks: 30**  
**University Exam Marks: 70**

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### Course Objectives:

To expose the students to the following:

1. To encourage students to practice free hand drawing with animation related techniques.
2. To apply drawing techniques for animation with the help of mannequins and uses of light box equipment for animation.
3. To analyze the line of action and create gesture drawing and understand the principles of animation with the help of basic cell animation exercises.
4. To learn the experimental animation.

### Course Outcomes:

After successful completion of course the student should be able to

CO1. Understand and apply techniques about drawing and sketching

CO2.Acquire knowledge about the basics form of arts required for animation course

CO3.Design and draw simple drawings in pencil and color about a given subject or concept

CO4.Demonstrate progress in human figure, cartoon, animals, birds and humanoids.

### UNIT I

**Introduction to animation:** History of animation: Types of animation: case study  
Understanding and learning the Principles of animation through the view of different animation films: case study.

### UNIT II

**Flip Book:** Drawing simple flip book with minimum 30 pages, Drawing a detail flip book with minimum 30 pages following the principles of animation

### UNIT III

**2D Software Interface:** Understanding the 2d software interface Drawing tools, pen tools and other necessary tools to create any drawing in the frames.

### UNIT IV

**Frame by frame animation:** Creating frame by frame animation for a short animation(maximum 10 sec with simple drawing. Creating simple frame by frame animation for a short animation(maximum 20 sec with color drawings and background.

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**UNIT V**

**Character drawing and creating symbols:** Drawing simple character with pen tool or shape tool Preparing the character for animation: dividing each body parts into symbol Creating symbols, types of symbols

**Text books:**

1.Frank Thomas and Odie Johnson, The Illusion of Life: Disney Animation, Disney Editions; Rev Sub edition, 2014.

**Reference books:**

1. Williams, R. The Animator's Survival Kit. Revised Edition, Faber & Faber, 2011.

**LIST OF PROGRAMS**

1. Basic Sketching for Develop Drawing Skill using many techniques
2. Quick rapid sketching and gesture drawing
3. Flip book design
4. Understanding Classical Animation & Principles of Animation
  - i. Time and Space
  - ii. Slow Out & Slow In
  - iii. Arc
  - iv. Squash & Stretch
  - v. Follow Through & Overlapping Action
5. Experimental Animation
6. Advance Sketching for Develop Drawing Skill using many techniques
7. Understanding Classical Animation & Principles of Animation
8. Study of expression

**Course Outcomes - Program Outcomes- Program Specific Outcomes (CO-PO-PSO) Mapping**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	-	M	-	-	L	-	-	-	-	-	-	M	H	L
CO2	H	-	-	M	-	L	-	-	-	-	-	-	H	L	-
CO3	-	-	H	M	-	-	-	-	-	L	-	-	M	H	L
CO4	-	-	-	-	L	-	-	-	-	-	H	M	H	-	M

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**20CSS12: VFX: Visual Effects****Credits – 2**  
**L:T:P:: 0:1:2****Sessional Marks: 40**  
**University Exam Marks: 60**

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**Course Objectives:**

To expose the students to the following:

1. To learn the Basics of compositing using layer based compositing software.
2. To understand the tools and techniques of compositing.
- 3.To practice the categories in compositing process.

**Course Outcomes:**

After successful completion of course the student should be able to

- CO1. Gain good understanding about compositing process.
- CO2. Identify major applications of compositing process used in industry.
- CO3. Develop a visual effects pipeline.
- CO4. Demonstrate an in-depth knowledge of grading and VFX principles, practice and system capabilities.
- CO5. Create customized tools through software or scripting to allow for more creative application of visual effects techniques.

**UNIT I**

Visual Effects: Set Up Your VFX Content Development Workstation, The Foundation of Raster for VFX: Pixels, Color, and Alpha; The Foundation of Motion for VFX: Frames and Codecs; The Foundation of Audio for VFX: MIDI, Wave, and Sample.

**UNIT II**

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The Foundation of 2D Vector for VFX: Point, Path, and SVG; The Foundation of 3D Vector for VFX: Models and OpenGL; Professional VFX Software: Black magic Design Fusion; VFX Pipeline Composition: Using the Flow Node Editor.

### UNIT III

VFX Pipeline Animation: Using the Timeline Editor; VFX Pipeline Motion Control: Using the Spline Editor; VFX Pipeline Pixel Isolation: Animated Polyline Masking; VFX Pipeline Automated Masking: Matte Generators.

### UNIT IV

VFX Pipeline Pixel Tracking: Using Motion Tracking; VFX Pipeline 3D Production: Compositing 3D Assets; VFX Pipeline 3D Rendering: Shader, Material, and Texture; VFX Pipeline 3D Modeling: 3D Text-Title Creation.

### UNIT V

VFX Pipeline 3D Animation: 3D Text-Titling Modifiers; Advanced VFX Pipeline Effects: 3D Particle Systems; Advanced VFX Pipeline Physics: 3D Particle Physics; Advanced Interactive VFX: i3D Content Publishing.

#### Reference books

1. Visual effects in a digital world by karen e. Goulekas
2. Vfx fundamentals: visual special effects using fusion 8.0 by wallace jackson
3. [digital] visual effects and compositing by martin watt and erwin coumans

#### Reference links

1. <http://chrisoatley.com/upcoming2015/>
2. <https://thewaltdisneycompany.com/employee-profile-spotlight-on-a-visualdevelopment-artist-2/>
3. <Http://www.artofvfx.com/escape-plan-chris-wells-vfx-supervisor-hydraulx/>
4. <Http://conceptartworld.com/artists/interview-with-visual-development-artistlandis-fields/>

### **LIST OF PROGRAMS**

1. Develop a concept. Gather some references such as photograph or a sketch.
2. Create a mind map of an environment.
3. Build a proper personality of a character and design the clothing or props the character.
4. Select couple of blockbuster vfx films and write up a vfx film analysis.
5. Provide proper lighting to the given model.
6. Integrate a 3d element into real photograph and match the lighting.

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7. Create 5 different effects using dynamics & particle effects – fire, smoke, water, building collapse, glass breaking
8. Add a blasting effect to the given footage.
9. Add snowfall effect to the given environment.
10. Building collapse scene using dynamics

**Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L	H	-	-	L	-	-	L	-	-	-	-	M	-	-
CO2	-	L	H	-	-	-	-	-	-	-	-	-	M	-	-
CO3	-	L	H	-	-	-	-	-	-	-	-	-	M	-	-
CO4	-	M	M	-	-	-	-	-	-	-	-	-	M	-	-
CO5	-	-	H	H	-	-	-	-	-	-	-	-	M	-	-

**20ECS03: FUNDAMENTALS OF PCB DESIGN**

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**Credits – 2**  
**L: T: P:: 0: 1 :2**

**Sessional Marks:40**  
**University Exam Marks:60**

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### **Course Objectives:**

1. Understand the need for PCB Design and steps involved in PCB Design and Fabrication process.
2. Familiarize Schematic and layout design flow using Electronic Design Automation (EDA) Tools.
3. Become familiar with the simulation software.
4. Learn to use Power logic and power PCB.
5. Learn various types of PCBs. Schematic Design. Entry Rules for Schematic Entry, Component Layout methods.

### **Course Outcomes:**

After successful completion of the course the students should be able to

CO1: Explore different aspect of Printed Circuit Board Design and fabrication.

CO2: Apply advance techniques, skills and modern tools for designing and fabrication of PCBs.

CO3: learn various types of PCBs. Schematic Design. Entry Rules for Schematic Entry, Component Layout methods.

CO4: Placement Rules, Routing Techniques for Single Sided Board.

CO5: Design and fabricate their own PCB for their Project and can also work in PCB Designing and Fabrication area.

### **Software Lab Session**

- ✓ **Fundamental of basic electronics**
- ✓ **Component identification**

- ✓ **Component symbols & their footprints**

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- Understand schematic
- Design rule checking
- Creating new PCB
- Track width selection
- Browsing footprints libraries
- Component selection
- Setting up the PCB layers
- Routing and completion of design

### **PCB Design Lab**

- Introduction to PCB manufacturing machines Understanding the manufacturing process of PCB
- Ultraviolet exposure and developing
- Introduction to the Machines
- Drilling and Etching Process
- Developing the negative film
- Printing the PCB layout design
- Copper clad preparation[photo Resist Dip Coating]
- Diagram, Board, Routing.

### **Text Books:**

1. Printed circuit board design ,fabrication assembly and testing By R. S. Khandpur, Tata McGraw Hill2006
2. Printed Circuits Handbook, Sixth Edition, by Clyde F. Coombs, Jr, Happy T. Holden, Publisher:McGraw-Hill Education Year: 2016

### **Reference Books:**

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1. Printed circuit Board Design and technology, Walter C. Bosshart
2. Complete PCB Design Using OrCAD Capture and PCB Editor, Kraig Mitzner  
BobDoe Alexander Akulin Anton Suponin Dirk Müller, 2nd Edition 2009.
3. Introduction to System-on-Package, Rao R Tummala&MadhavanSwaminathan,  
McGraw Hill,2008.
4. EMC and Printed circuit board ,Design theory and layout, Mark I Montrose  
IEEEcompatibility society
5. Flexible Printed circuit board Design and manufacturing ,By Robert torzwell

**Course Outcomes-Program Outcomes- Program Specific Outcomes (CO-PO-PSO) Mapping**

	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	M												H	M	L
CO2			L		H								M	M	
CO3	M	M		H									H	M	L
CO4					M								M	M	
CO5													H	L	

**20ECS04: ADVANCED PCB DESIGN****Credits – 2****L: T: P:: 0: 1 :2****Sessional Marks:40****University Exam Marks:60**

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**Course Objectives:**

The objective of this course is to provide students with

1. Understanding of the designing and generation of artwork of the pcbs for analog, digital, high frequency and power electronics applications.
2. Understanding of fabrication of different types of pcbs such as ssb, dsb, path.
3. Understanding of fabrication techniques such as photo printing, screen printing.
4. Knowledge of different mechanical and electrical operations required for fabrication of pcbs.
5. Knowledge of chemicals and materials used for the pcb fabrication.
6. Understanding of the fabrication of small series of highly reliable, professional quality pcbs with low investment cost.

**Course Outcomes:**

1. The students will be able to design electrical and electronic circuits and conduct experiments, analyze and interpret data.
2. The students will be use advance techniques, skills and modern tools for designing PCBs.
3. The student will be able to apply creativity in the design of systems, components or processes appropriate to program objectives.
4. The students will be able to work in R&D laboratories in telecommunication and biomedical electronics.
5. The students will be able to understand advance technology such as CMOS VLSI and nanotechnology fabrication techniques.

**LIST OF PROGRAMS**

**Draw the layout and prepare the PCB for the design, construction and testing of the following,**

1. Identification of various types of Printed Circuit Boards (PCB) and soldering techniques.
2. Identifying different components R, L, C, Diodes, Transistors, Switches.
3. Ultraviolet exposure and developing.
4. Drilling and Etching process.
5. Copper clad preparation.

6. Adders( Half adder, Full adder).
7. Random Access Memory.
8. Read Only Memory.
9. Digital to Analog Converter.
10. Analog to Digital Converter.
11. CE Amplifier.
12. Printing the PCB layout design.

**Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO)  
Mapping**

	PO 1	PO 2	PO 3	PO4	PO 5	P O6	P O7	P O8	P O9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
<b>C O1</b>		H		L	H			L					H			L
<b>C O2</b>	M	M		L	H	L							M			L
<b>C O3</b>		M			H	M							M			L
<b>C O4</b>		M			H								M			L
<b>C O5</b>		M	H													L

