

**SARDAR PATEL UNIVERSITY**  
**Syllabus Structure B.Sc. Semester: III**  
**With Effect from: June – 2024**

**Bachelor of Science**  
**B.Sc. Electronics and Communication Semester III**  
**(Major subject- Minor subject - Interdisciplinary subject)**

<b>Course Code</b>	<b>US03MAELC01</b>	<b>Title of the Course</b>	<b>Electronics Devices and Circuits - II</b>
<b>Total Credits of the Course</b>	<b>04</b>	<b>Hours per Week</b>	<b>04</b>

<p>Programme Outcome (PO) - For B.Sc. Electronics and Communication Programme</p>	<ol style="list-style-type: none"> <li>1. Bachelor of Science degree program provides theoretical and practical knowledge of different Science subjects in consonance with National Education Policy 2020.</li> <li>2. This programme provides a flexibility to students to acquire certificate course, diploma course, degree programme, honours degree with or without research having multi entry and multi exit facilities.</li> <li>3. Bachelor of Science programme at Sardar Patel University is designed keeping the overall back ground preparation in mind for the student to either opt for a Master programme or jobs or to become an entrepreneur.</li> <li>4. At the entry level of the programme, i.e., semester one, various subjects offered as major subject, minor subject, interdisciplinary subject as per choice of the students.</li> <li>5. In addition to that, some skill enhancement courses, ability enhancement courses and value-added courses are also offered for overall development of the students.</li> <li>6. After end of the even semesters, the students may take exit after fulfilling the minimum requirements.</li> <li>7. The students have the enough opportunity to complete four-year graduation programme with any major subject as per their choice.</li> <li>8. The students, after completion of the program from Sardar Patel University, can opt for the master’s degree programme in the subject they have had at the final semester, or in a related discipline.</li> </ol>
<p>Programme Specific Outcome (PSO) – B.Sc. (Electronics and Communication) Programme</p>	<ol style="list-style-type: none"> <li>1. To improve the scientific awareness among the students.</li> <li>2. To make students to understand the role and contribution of Electronics and Communication in the development of science and technology.</li> <li>3. To improve scientific attitude and to give emphasis on the development of experimental skills, data analysis, calculations, and also on the limitations of the experimental method and data as well as results obtained.</li> <li>4. To help students in understanding the concepts of Electronics and Communication.</li> <li>5. To emphasize the strength of equations, formulae, graphs, mathematical tools to solve the problems.</li> <li>6. To understand the conceptual development of the subject and thereby develop the interest in the subject.</li> <li>7. To create interest in the subject and improve technological aspect through mini projects, projects, models, demonstrations, etc.</li> <li>8. To create interest in the subject to continue to work in the field of science particularly in Electronics and Communication.</li> <li>9. To Understand the impact of electronics in modern era.</li> </ol>



<b>Course Objectives:</b>	<p>1. In this course, students will be learning about the electronics instrument which were used in our day to-day life.</p> <p>2. To understand the basics of semiconductor components like resistor, capacitor and inductor their applications will be introduced.</p>
---------------------------	--

<b>Course Content</b>		
<b>Unit</b>	<b>Description</b>	<b>Weightage* (%)</b>
<b>1.</b>	Diodes and Circuits Review of device construction, operation, characteristics and voltage and current equations for – PN junction diode, Schottky diode, Light Emitting Diode, Laser Diode, Zener Diode, GUNN diode etc. Design of diode circuits- Full Wave, Half Wave and Bridge Rectifiers, Detectors, Single and Balanced Mixers, Clippers and Clampers, Over-voltage protection circuits. Diodes for device isolation in semiconductor process. Diode as voltage dependent capacitor in Voltage Controlled Oscillator, Diode as a voltage reference	<b>25%</b>
<b>2.</b>	BJTs and FETs Review of device construction, operation, characteristics and voltage and current equations for- Bipolar Junction Transistor, MOSFET and MESFET Heterojunction BJT (HBT) features to improve forward current gain, terminal frequency and power capability. HBTs in SiGe, GaAs and GaN. Scaling of Gate Length in MOSFET.	<b>25%</b>
<b>3</b>	Feedback Amplifiers and Oscillators Lead Compensation, Split Pole Compensation, Source Degeneration, Barkhausen criteria of stability, Feedback Oscillators- Hartley, Colpitts, Ring Oscillator, LC-Oscillators, Jitter and Phase Noise, Effect of phase noise on RADAR and communication systems, Crystal Oscillators	<b>25%</b>
<b>4</b>	Use of various workshop tools: Nose pliers, wire stripper, wire cutter. Study and understanding; electronic circuit diagrams. Transfer and testing of circuit diagram to Bread. Introduction to PCB, Types of PCBs: Single sided PCB, double sided PCB and multilayered PCB, PCB Materials, Component identification on PCB; General purpose PCB, Custom made PCB- types of PCB and their use, Transfer and testing of circuit diagram to 14 hrs PCB, Soldering and De-soldering - technique-requirements and methods.	<b>25%</b>

<b>Teaching-Learning Methodology</b>	<p>Direct Teaching through Chalk-Walk and Talk</p> <p>ICT enabled teaching</p> <p>Question-Answer</p> <p>Class discussion led by teacher/students</p> <p>Case Studies</p> <p>Literature review</p> <p>Problem solving activities</p> <p>Debate</p> <p>Collaborative and Co-operative Learning</p> <p>Think Pair Share</p> <p>Jigsaw</p>
--------------------------------------	---



	Inquiry Based Learning Panel Discussion Project Based Learning Flipped Classroom Blended Learning designs Concept Mapping
--	--

<b>Evaluation Pattern</b>		
<b>Sr. No.</b>	<b>Details of the Evaluation</b>	<b>Weightage</b>
1.	Internal Written / Practical Examination Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	50%
2.	University Examination	50%

Course Outcomes: On the successful completion of the course, the students will be able to understand

<b>Suggested References:</b>	
<b>Sr. No.</b>	<b>References</b>
1.	Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., “Elements of Workshop Technology”, Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai
2.	Basic Electronics & Linear Circuits, Bhargava N. N., D C Kulshreshtha and S C Gupta, Tata McGraw Hill, 2/e, 2013
3.	Millman & Halkias, Electronic Devices & Circuits, TMH
4.	Boylestad & Nashelsky, Electronics Devices & Circuits, Pearson Education

On-line resources to be used if available as reference material

On-line Resources:

<https://www.electronics-tutorials.ws/>  
<https://www.electronicshub.org/tutorials/>  
[www.allaboutcircuits.com](http://www.allaboutcircuits.com)

\*\*\*\*\*



**SARDAR PATEL UNIVERSITY**  
**Syllabus Structure B.Sc. Semester: III**  
**With Effect from: June – 2024**  
**Bachelor of Science**

**B.Sc. Electronics and Communication Semester III**  
**(Major subject- Minor subject - Interdisciplinary subject)**

<b>Course Code</b>	<b>US03MAELC02</b>	<b>Title of the Course</b>	<b>Analog Communication</b>
<b>Total Credits of the Course</b>	<b>04</b>	<b>Hours per Week</b>	<b>04</b>

<p>Programme Outcome (PO) - For B.Sc. Electronics and Communication Programme</p>	<ol style="list-style-type: none"> <li>1. Bachelor of Science degree program provides theoretical and practical knowledge of different Science subjects in consonance with National Education Policy 2020.</li> <li>2. This programme provides a flexibility to students to acquire certificate course, diploma course, degree programme, honours degree with or without research having multi entry and multi exit facilities.</li> <li>3. Bachelor of Science programme at Sardar Patel University is designed keeping the overall back ground preparation in mind for the student to either opt for a Master programme or jobs or to become an entrepreneur.</li> <li>4. At the entry level of the programme, i.e., semester one, various subjects offered as major subject, minor subject, interdisciplinary subject as per choice of the students.</li> <li>5. In addition to that, some skill enhancement courses, ability enhancement courses and value-added courses are also offered for overall development of the students.</li> <li>6. After end of the even semesters, the students may take exit after fulfilling the minimum requirements.</li> <li>7. The students have the enough opportunity to complete four-year graduation programme with any major subject as per their choice.</li> <li>8. The students, after completion of the program from Sardar Patel University, can opt for the master's degree programme in the subject they have had at the final semester, or in a related discipline.</li> </ol>
<p>Programme Specific Outcome (PSO) – B.Sc. (Electronics and Communication) Programme</p>	<ol style="list-style-type: none"> <li>1. To improve the scientific awareness among the students.</li> <li>2. To make students to understand the role and contribution of Electronics and Communication in the development of science and technology.</li> <li>3. To improve scientific attitude and to give emphasis on the development of experimental skills, data analysis, calculations, and also on the limitations of the experimental method and data as well as results obtained.</li> <li>4. To help students in understanding the concepts of Electronics and Communication.</li> <li>5. To emphasize the strength of equations, formulae, graphs, mathematical tools to solve the problems.</li> <li>6. To understand the conceptual development of the subject and thereby develop the interest in the subject.</li> <li>7. To create interest in the subject and improve technological aspect through mini projects, projects, models, demonstrations, etc.</li> <li>8. To create interest in the subject to continue to work in the field of science particularly in Electronics and Communication.</li> <li>9. To motivate students to make career in Electronics and Communication.</li> </ol>



<b>Course Objectives:</b>	<p>1. In this course, students will be learning about the electronics instrument which were used in our day to-day life.</p> <p>2. To understand the basics of semiconductor components like resistor, capacitor and inductor their applications will be introduced.</p>
---------------------------	--

<b>Course Content</b>		
<b>Unit</b>	<b>Description</b>	<b>Weightage* (%)</b>
<b>1.</b>	Amplitude Modulation Introduction to communication system, Need for modulation, Frequency Division Multiplexing, Amplitude Modulation, Definition, Time domain and frequency domain description, single tone modulation, power relations in AM waves, Generation of AM waves, Switching modulator, Detection of AM Waves; Square law detector, Envelope detector, Double side band suppressed carrier modulators, time domain and frequency domain description, Generation of DSBSC Waves, Balanced Modulators, Ring Modulator	<b>25%</b>
<b>2.</b>	SSB Modulation Frequency domain description, Frequency discrimination method for generation of AM SSB Modulated Wave, Time domain description, Phase discrimination method for generating AM SSB Modulated waves. Demodulation of SSB Waves, Vestigial side band modulation: Frequency description, Generation of VSB Modulated wave, Time domain description, Envelope detection of a VSB Wave pulse Carrier, Comparison of AM Techniques.	<b>25%</b>
<b>3</b>	Angle Modulations Basic concepts, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave, Narrow band FM, Wide band FM, Constant Average Power, Transmission bandwidth of FM Wave - Generation of FM Waves, Direct FM, Detection of SE CBCS 2017-18 FM Waves: Balanced Frequency discriminator, Zero crossing detector, Comparison of FM and AM.	<b>25%</b>
<b>4</b>	Noise in Analog Modulation Definition, classification, Noise in Analog communication System, Noise in DSB and SSB System, Noise in AM System, Noise in Angle Modulation System, Threshold effect in Angle Modulation System, Pre-emphasis and de-emphasis.	<b>25%</b>

<b>Teaching-Learning Methodology</b>	<p>Direct Teaching through Chalk-Walk and Talk</p> <p>ICT enabled teaching</p> <p>Question-Answer</p> <p>Class discussion led by teacher/students</p> <p>Case Studies</p> <p>Literature review</p> <p>Problem solving activities</p> <p>Debate</p> <p>Collaborative and Co-operative Learning</p> <p>Think Pair Share</p> <p>Jigsaw</p>
--------------------------------------	---



	Inquiry Based Learning Panel Discussion Project Based Learning Flipped Classroom Blended Learning designs Concept Mapping
--	--

<b>Evaluation Pattern</b>		
<b>Sr. No.</b>	<b>Details of the Evaluation</b>	<b>Weightage</b>
1.	Internal Written / Practical Examination Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	50%
2.	University Examination	50%

Course Outcomes: On the successful completion of the course, the students will be able to understand

<b>Suggested References:</b>	
<b>Sr. No.</b>	<b>References</b>
1.	Simon Haykin, Analog and Digital Communications, John Wiley, 2005
2.	Simon Haykin, Analog and Digital Communications, John Wiley, 2005
3.	K. Sam Shanmugam ,Analog and Digital Communication, Willey ,2005

On-line resources to be used if available as reference material

On-line Resources:

<https://www.electronics-tutorials.ws/>  
<https://www.electronicshub.org/tutorials/>  
[www.allaboutcircuits.com](http://www.allaboutcircuits.com)

\*\*\*\*\*



**SARDAR PATEL UNIVERSITY**  
**Syllabus Structure B.Sc. Semester: III**  
**With Effect from: June – 2024**  
**Bachelor of Science**  
**B.Sc. Electronics and Communication Semester III**  
**(Major subject- Minor subject - Interdisciplinary subject)**

<b>Course Code</b>	<b>US03MAELC03</b>	<b>Title of the Course</b>	<b>Practical</b>
<b>Total Credits of the Course</b>	<b>04</b>	<b>Hours per Week</b>	<b>08</b>

<b>Course Content</b>		
<b>Sr. No.</b>	<b>List of Experiments</b>	<b>Weightage* (%)</b>
<b>1.</b>	V-I Characteristics of Silicon & Germanium PN Junction diodes	
<b>2.</b>	Diode as clipper and clamper	
<b>3</b>	V-I Characteristics of Zener Diode	
<b>4</b>	Half Wave and Full Wave Rectifier Without Filter	
<b>5</b>	Half Wave and Full Wave Rectifier Without Filter	
<b>6</b>	Common Emitter BJT Amplifier	
<b>7</b>	Diode Detector Characteristics	
<b>8</b>	Implement the circuit for Amplitude Modulation and Demodulation	
<b>9</b>	Regulated power supply using Transistor and Zenner Diodes	
<b>10</b>	Determine modulation index	



**SARDAR PATEL UNIVERSITY**  
**Syllabus Structure B.Sc. Semester: III**  
**With Effect from: June – 2024**  
**Bachelor of Science**

**B.Sc. Electronics and Communication Semester III**  
**(Major subject- Minor subject - Interdisciplinary subject)**

<b>Course Code</b>	<b>US03IDELC01</b>	<b>Title of the Course</b>	<b>Electronics Devices and Circuits - II</b>
<b>Total Credits of the Course</b>	<b>02</b>	<b>Hours per Week</b>	<b>02</b>

<p>Programme Outcome (PO) - For B.Sc. Electronics and Communication Programme</p>	<ol style="list-style-type: none"> <li>1. Bachelor of Science degree program provides theoretical and practical knowledge of different Science subjects in consonance with National Education Policy 2020.</li> <li>2. This programme provides a flexibility to students to acquire certificate course, diploma course, degree programme, honours degree with or without research having multi entry and multi exit facilities.</li> <li>3. Bachelor of Science programme at Sardar Patel University is designed keeping the overall back ground preparation in mind for the student to either opt for a Master programme or jobs or to become an entrepreneur.</li> <li>4. At the entry level of the programme, i.e., semester one, various subjects offered as major subject, minor subject, interdisciplinary subject as per choice of the students.</li> <li>5. In addition to that, some skill enhancement courses, ability enhancement courses and value-added courses are also offered for overall development of the students.</li> <li>6. After end of the even semesters, the students may take exit after fulfilling the minimum requirements.</li> <li>7. The students have the enough opportunity to complete four-year graduation programme with any major subject as per their choice.</li> <li>8. The students, after completion of the program from Sardar Patel University, can opt for the master's degree programme in the subject they have had at the final semester, or in a related discipline.</li> </ol>
<p>Programme Specific Outcome (PSO) – B.Sc. (Electronics and Communication) Programme</p>	<ol style="list-style-type: none"> <li>1. To improve the scientific awareness among the students.</li> <li>2. To make students to understand the role and contribution of Electronics and Communication in the development of science and technology.</li> <li>3. To improve scientific attitude and to give emphasis on the development of experimental skills, data analysis, calculations, and also on the limitations of the experimental method and data as well as results obtained.</li> <li>4. To help students in understanding the concepts of Electronics and Communication.</li> <li>5. To emphasize the strength of equations, formulae, graphs, mathematical tools to solve the problems.</li> <li>6. To understand the conceptual development of the subject and thereby develop the interest in the subject.</li> <li>7. To create interest in the subject and improve technological aspect through mini projects, projects, models, demonstrations, etc.</li> <li>8. To create interest in the subject to continue to work in the field of science particularly in Electronics and Communication.</li> <li>9. To Understand the impact of electronics in modern era.</li> </ol>





<b>Course Objectives:</b>	<p>3. In this course, students will be learning about the electronics instrument which were used in our day to-day life.</p> <p>4. To understand the basics of semiconductor components like resistor, capacitor and inductor their applications will be introduced.</p>
---------------------------	--

<b>Course Content</b>		
<b>Unit</b>	<b>Description</b>	<b>Weightage* (%)</b>
<b>1.</b>	Diodes and Circuits Review of device construction, operation, characteristics and voltage and current equations for – PN junction diode, Schottky diode, Light Emitting Diode, Laser Diode, Zener Diode, GUNN diode etc. Design of diode circuits- Full Wave, Half Wave and Bridge Rectifiers, Detectors, Single and Balanced Mixers, Clippers and Clampers, Over-voltage protection circuits. Diodes for device isolation in semiconductor process. Diode as voltage dependent capacitor in Voltage Controlled Oscillator, Diode as a voltage reference	<b>25%</b>
<b>2.</b>	BJTs and FETs Review of device construction, operation, characteristics and voltage and current equations for- Bipolar Junction Transistor, MOSFET and MESFET Heterojunction BJT (HBT) features to improve forward current gain, terminal frequency and power capability. HBTs in SiGe, GaAs and GaN. Scaling of Gate Length in MOSFET.	<b>25%</b>

<b>Teaching-Learning Methodology</b>	<p>Direct Teaching through Chalk-Walk and Talk</p> <p>ICT enabled teaching</p> <p>Question-Answer</p> <p>Class discussion led by teacher/students</p> <p>Case Studies</p> <p>Literature review</p> <p>Problem solving activities</p> <p>Debate</p> <p>Collaborative and Co-operative Learning</p> <p>Think Pair Share</p> <p>Jigsaw</p> <p>Inquiry Based Learning</p> <p>Panel Discussion</p> <p>Project Based Learning</p> <p>Flipped Classroom</p> <p>Blended Learning designs</p> <p>Concept Mapping</p>
--------------------------------------	---



### Evaluation Pattern

Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	50%
2.	University Examination	50%

Course Outcomes: On the successful completion of the course, the students will be able to understand

### Suggested References:

Sr. No.	References
1.	Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., "Elements of Workshop Technology", Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai
2.	Basic Electronics & Linear Circuits, Bhargava N. N., D C Kulshreshtha and S C Gupta, Tata McGraw Hill, 2/e, 2013
3.	Millman & Halkias, Electronic Devices & Circuits, TMH
4.	Boylestad & Nashelsky, Electronics Devices & Circuits, Pearson Education

On-line resources to be used if available as reference material

On-line Resources:

<https://www.electronics-tutorials.ws/>  
<https://www.electronicshub.org/tutorials/>  
[www.allaboutcircuits.com](http://www.allaboutcircuits.com)

\*\*\*\*\*



**SARDAR PATEL UNIVERSITY**  
**Syllabus Structure B.Sc. Semester: III**  
**With Effect from: June – 2024**  
**Bachelor of Science**  
**B.Sc. Electronics and Communication Semester III**  
**(Major subject- Minor subject - Interdisciplinary subject)**

<b>Course Code</b>	<b>US03IDELC02</b>	<b>Title of the Course</b>	<b>Practical</b>
<b>Total Credits of the Course</b>	<b>02</b>	<b>Hours per Week</b>	<b>04</b>

<b>Course Content</b>		
<b>Sr. No.</b>	<b>List of Experiments</b>	<b>Weightage* (%)</b>
<b>1.</b>	V-I Characteristics of Silicon & Germanium PN Junction diodes	
<b>2.</b>	Diode as clipper and clamper	
<b>3</b>	Half Wave and Full Wave Rectifier Without Filter	
<b>4</b>	Implement the circuit for Amplitude Modulation and Demodulation	
<b>5</b>	Regulated power supply using Transistor and Zenner Diodes	
<b>6</b>	Determine modulation index	

