

**Government of Karnataka**  
**Department of Technical Education**  
**Board of Technical Examinations, Bengaluru**

<b>Course Title: Analog Electronics Lab</b>		<b>Course Code: 15MC36P</b>
<b>Mode (L:T:P) : 0:2:4</b>	<b>Credits:3</b>	<b>Core/ Elective: Core</b>
<b>Type of Course: Tutorials and Practical's</b>		<b>Total Contact Hours: 78</b>
<b>CIE- 25 Marks</b>		<b>SEE- 50 Marks</b>

**Prerequisites:** Knowledge of Analog Electronics.

**Course Objective:** Understand the Working and Trouble shooting of power supplies and OPAMP circuits and Timers.

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

1. Test the working of power supplies.
2. Test the working of Transistor Amplifiers and Oscillators
3. Apply OP-AMP in Linear and Non-Linear Applications
4. Understand the working of Timers.

<b>Course Outcome</b>		<b>Cognitive Level</b>	<b>Linked with PO</b>	<b>Teaching Hours</b>
<b>CO1</b>	Testing the working of power supplies.	A	1,2,3	18
<b>CO2</b>	Testing the working of Transistor Amplifiers and Oscillators	A	1,2,3	18
<b>CO3</b>	Apply OP-AMP in Linear and Non-Linear Applications	A	1,2,3	24
<b>CO4</b>	Understand the working of Timers	A	1,2,3	18
		<b>Total sessions</b>		<b>78</b>

**Legend: R; Remember, U: Understand A: Application**

### Mapping of Course Outcomes with Program Outcomes

<b>Course</b>	<b>Programme Outcomes</b>									
	1	2	3	4	5	6	7	8	9	10
<b>Analog Electronics Lab</b>	<b>3</b>	<b>3</b>	<b>3</b>	-	-	-	-	-	-	-

*Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.*

*Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.*

*If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3*

*If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2*

*If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1*

*If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.*

## **Contents**

1. Construct half wave rectifier. Calculate ripple factor with and without pi filter. Study the wave forms on CRO.
2. Construct Bridge Full wave rectifier. Calculate ripple factor with and without Capacitor filter. Study the wave forms on CRO.
3. Construct and test series type transistor voltage regulator.
4. Construct and test 3 terminal IC Fixed voltage regulators.
5. Construct and test 3 terminal IC Variable voltage regulators.
6. Construct RC coupled amplifier and plot frequency response curve, calculate band width.
7. Construct and test pushpull amplifier.
8. Construct and find frequency of oscillation (by CRO) for Hartley oscillators.
9. Construct and find frequency of oscillation (by CRO) for Crystal oscillator
10. Construct and test Inverting and non-inverting amplifier.
11. Construct and test Differentiator and integrator.
12. Construct and test Summing Amplifier
13. Construct and find frequency of oscillation (by CRO) for RC phase shift oscillator.
14. Construct and test Voltage follower
15. Construct and test Schmitt's trigger.
16. Construct and test Low pass filter using OPAMP .
17. Construct and test Monostable multi vibrator using IC 555,
18. Construct and test Astable multi vibrator using IC 555.

### Contents linked with CO and PO

Sl No	Contents	CO	PO
1	Construct half wave rectifier. Calculate ripple factor with and without pi filter. Study the wave forms on CRO	1	1,2,3
2	Construct Bridge Full wave rectifier. Calculate ripple factor with and without Capacitor filter. Study the wave forms on CRO.	1	1,2,3
3	Construct and test series type transistor voltage regulator.	1	1,2,3
4	Construct and test 3 terminal IC Fixed voltage regulators	1	1,2,3
5	Construct and test 3 terminal IC Variable voltage regulators	1	1,2,3
6	Construct RC coupled amplifier and plot frequency response curve, calculate band width.	2	1,2,3
7	Construct and test pushpull amplifier.	2	1,2,3
8	Construct and find frequency of oscillation (by CRO) for Hartley oscillators.	2	1,2,3
9	Construct and find frequency of oscillation (by CRO) for Crystal oscillator	2	1,2,3
10	Construct and test Inverting and non-inverting amplifier.	3	1,2,3
11	Construct and test Differentiator and integrator.	3	1,2,3
12	Construct and test Summing Amplifier	3	1,2,3
13	Construct and find frequency of oscillation (by CRO) for RC phase shift oscillator.	3	1,2,3
14	Construct and test Voltage follower	3	1,2,3
15	Construct and test Schmitt's trigger.	3	1,2,3
16	Construct and test Low pass filter using OPAMP .	3	1,2,3
17	Construct and test Monostable multi vibrator using IC 555,	4	1,2,3
18	Construct and test Astable multi vibrator using IC 555.	4	1,2,3

### Scheme of valuation for SEE

Sl. no.	Performance	Max. Marks
1	Writing circuit with values Tabular column, formula & Ideal graph.	15
2	Construction and conduction	20
3	Result	05
5	Viva Voce	10
	<b>TOTAL</b>	<b>50</b>

### Student Activity



Activity No.	Description of the Student Activity
1	Build hobby circuit such as door bell, calling bell, blinking LED etc
2	Students can Build a Miniature circuits consists of Transistors, OP-AMP and IC555

**Note:**

1. Group of max four students should do any one of the above activity or any other similar activity related to the course Cos and get it approved from concerned Teacher and HOD.
2. No group should have activity repeated or similar
3. Teacher should ensure activities by group must cover all COs
4. Teacher should asses every student by using suitable **Rubrics** approved by HOD

**Rubrics**

Dimension	Exemplary	Accomplished	Developing	Beginning	Roll No. of the Student				
	5/4	3	2	1	1	2	3	4	5
<b>Organization</b>	Information presented in logical, interesting sequence	Information in logical sequence	Difficult to follow presentation-- student jumps around	Cannot understand presentation-- no sequence of information	Ex: 2				
<b>Subject Knowledge</b>	Demonstrates full knowledge by answering all class questions with explanations and elaborations	At ease with expected answers to questions but does not elaborate	Uncomfortable with information and is able to answer only rudimentary questions	Does not have a grasp of the information. Cannot answer questions about subject	3				
<b>Graphics</b>	Explain and reinforce screen text and presentation	Relate to text and presentation	Occasionally uses graphics that rarely support text and presentation	Uses superfluous graphics or no graphics	4				
<b>Oral Presentation</b>	Maintains eye contact and pronounces all terms precisely. All audience members can hear	Maintains eye contact most of the time and pronounces most words correctly. Most audience members can hear presentation	Occasionally uses eye contact, mostly reading presentation, and incorrectly pronounces terms. Audience members have difficulty hearing	Reads with no eye contact and incorrectly pronounces terms. Speaks too quietly	5				
<b>Total Score=(2+3+4+5)=14/4=3.5=4</b>									

### Course Assessment Pattern

Particulars			Max Marks	Evidence	Course outcomes
<b>Direct Assessment</b>	<b>CIE</b>	Two test (Average of Two tests)	10	Blue books	1,2,3 &4
		Practical record	10	Practical record	1,2,3 &4
		Student Activity	05	Student Activity Sheets	1,2,3 &4
	<b>SEE</b>	End of the course	50	Answer scripts at BTE	1,2,3 &4
<b>Indirect Assessment</b>	<b>Student Feedback on course</b>	Middle of the course		Feedback forms	1 &2
		End of the course		Feedback forms	3 &4

\***CIE** – Continuous Internal Evaluation

\***SEE** – Semester End Examination

**Note:**

1. I.A. test shall be conducted as per SEE scheme of valuation. However obtained marks shall be reduced to 10 marks. Average marks of two tests shall be rounded off to the next higher digit.
2. Rubrics to be devised appropriately by the concerned faculty to assess Student activities.