**Round 1 Document**

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### Department : Electronics and Communication Engineering

### Discipline : Electronics,Instrumentation,Electrical,Marine,Automobile

### Name of the Lab : Basic Electronics Lab/Hybrid Electronics Lab

### Name of experiment : Summer and Subtractor using Operational Amplifier 741.

### FOCUS AREA : Configuring Operational amplifier as Summer and Subtractor.

**About the Experiment:** The experiment opens up the introduction to operational amplifiers and their applications and advantages.

Experiment provides exposure to students in better understanding of applications by configuring Operational amplifier as summer and subtractor.

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### 1. Learning Objectives and Cognitive Level:

### Experiment 2

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| --- | --- | --- | --- |
| **Sr. No** | **Learning Objectives** | **Cognitive level** | **Action Verb** |
| 1. | *Students will be able* to use appropriate number of inputs as their requirement*.* | Understand | Select |
| 2. | *Students will be able to* use Regulated power supply as signal source. | Recall | Define |
| 3. | *Students will be exposed* to handling ofIntegrated Circuits and apply connections to it. | Apply | Construct |
| 4. | *Students will be able* to set required value of input signal from the source and verify the set value in display | Apply | Retained |
| 5. | *Students will be able to* measure the output of the circuit they have constructed. | Analyse | Measure |
| 6. | *Students will be able to* analyse the outcome of the experiment. | Analyse | Analyse |
| 7. | *Students will be able to* evaluate the working of the circuits constructed. | Evaluate | Evaluate |

**2. Instructional Strategy:**

**2. 1 Instructional Strategy:** Expository **(**Online Manual/Trial and error of working,learning and

analysis)

**2.2 Assessment Method :**Formative assessment

* 1. **Description of section :**Provided as instructions
* Detailed theory is provided to help understanding of basic concepts, example on signal analysis and understanding will be provided for further clarity.
* A detailed stepwise procedure will be provided which helps the students to perform the entire experiment on VLAB platform.
* Implementing the procedure, provides the student, a feel of real laboratory experience.
* Pre-quiz and post-quiz will be provided, that helps student to test their understanding.
* Assignment questions will be provided to the students for extended learning.
* Once the students go through the virtual lab experiments, they can perform those experiments in real lab effectively.

**3.Task & Formattive Questions:**

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| --- | --- | --- | --- |
| **Sr. No.** | **Instructions given   by the**  **Teacher** | **Tasks to be done by the**  **Students** | **Assessment questions aligned to the task** |
| 1. | Define Basics of Op -Amp | Define what is op – amp and its pin configurations . | Q3 |
| 2. | Analysis of different Op – Amps | Know about different op – amps , their purpose and simulation. | Q1,Q2 |
| 3. | Procedure of summer and subtractor | Turn on the circuit , and analyse the results based on circuits. | Q4, Q5 |

1. Which of the following is a military grade op-amp?
2. 741
3. 741C
4. **741S**
5. 741SC
6. The op-amps 741C and 741E are identical to op-amps
7. 741S and 741A
8. **741 and 741A**
9. 741A and 741SC
10. 741 and 741S
11. General purpose op-amp cannot be used for the application
12. Integrator
13. Differentiator
14. Summer
15. **Audio Power Amplifier**
16. Find the input voltage of an ideal op-amp. It’s one of the inputs and output voltages are 2v and 12v. (Gain=3)
17. 8V
18. 4V
19. -4V
20. **-2V**
21. Find the output voltage of an ideal op-amp. If V1 and V2 are the two input voltages
22. VO= V1-V2
23. **VO= A×(V1-V2)**
24. VO= A×(V1+V2)
25. VO= V1×V2

### 4. Simulator Interactions:

**Experiment 2**

|  |  |  |  |
| --- | --- | --- | --- |
| Sr. No | What students will do? | What Simulator will do? | Purpose of the task |
| 1 | Study the objectives and apparatus used then click on next button | Display objective and apparatus used | Recall the experiment |
| 2 | Study of components and equipments | Open up connection panel | Set up connections |
| 3 | Carry out suitable design of circuits by suitably adjusting the component values. | Model the designed circuit layout | Validation of design |
| 4 | Click on the connecting lines across suitable points | Wire the circuit and make suitable connections | Circuit construction |
| 5 | Click the power supply button to power up the circuit | Switch ON the supply | Powering of circuit |
| 6 | Click the button to connect and to set the initial values in source and measuring devices | Fix up the needed values in source and connects the measuring displays. | To study how to set inputs and observe outputs. |
| 7 | Vary the inputs for learning and evaluation | Record the outputs in a table form | Verify the working of the circuit |