

Test: CLAT- 1

Course Code &amp; Title: 18ECC201J – Analog Electronic Circuits

Year &amp; Sem: II / IV

Date: 07-04-2022

Duration: 60 minutes

Max. Marks: 25

**Course Articulation Matrix:**

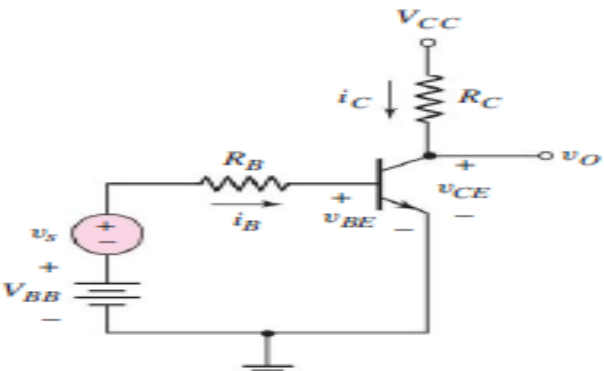
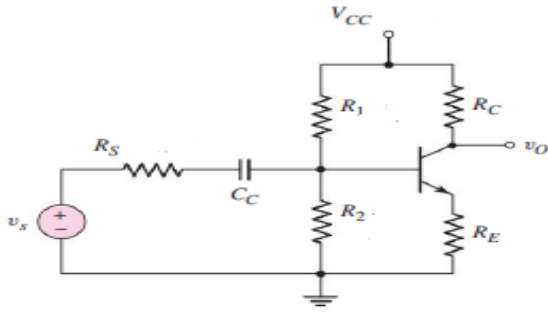
| Course Articulation Matrix:            |   | Program Outcomes (POs) |   |   |   |   |   |   |   |   |    |    |    |     |   |   |
|--|---|------------------------|---|---|---|---|---|---|---|---|----|----|----|-----|---|---|
| 18ECC201J - Analog Electronic Circuits |   | Graduate Attributes    |   |   |   |   |   |   |   |   |    |    |    | PSO |   |   |
| COs                                    | Course Outcomes (COs)   | 1                      | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1   | 2 | 3 |
| CO-1                                   | Analyze bipolar amplifier circuits and their frequency response.  | 1                      | 2 | 3 | - | - | - | - | - | - | -  | -  | -  | -   | - | - |
| CO-2                                   | Develop MOSFET amplifier circuits and their frequency response.   | 1                      | 2 | 3 | - | - | - | - | - | - | -  | -  | -  | -   | - | - |
| CO-3                                   | Compile various negative feedback amplifier and oscillator circuits.  | 1                      | - | 3 | - | - | - | - | - | - | -  | -  | -  | -   | - | - |
| CO-4                                   | Demonstrate the different classes of power amplifiers according to their performance characteristics.                         | 1                      | 2 | 3 | - | - | - | - | - | - | -  | -  | -  | -   | - | - |
| CO-5                                   | Construct the basic circuit building blocks that are used in the design of IC amplifiers, namely current mirrors and sources. | 1                      | 2 | 3 | - | - | - | - | - | - | -  | -  | -  | -   | - | - |
| CO-6                                   | Organize analog electronic circuits using discrete components to measure various analog circuits' performance.                | -                      | - | 3 | - | - | - | - | - | 2 | -  | -  | -  | 3   | 1 | - |

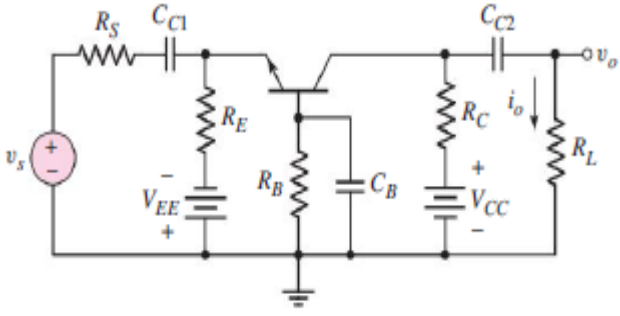
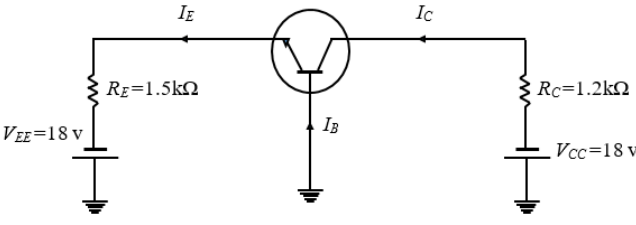
**Part - A**

(5 x 1 = 5 Marks)

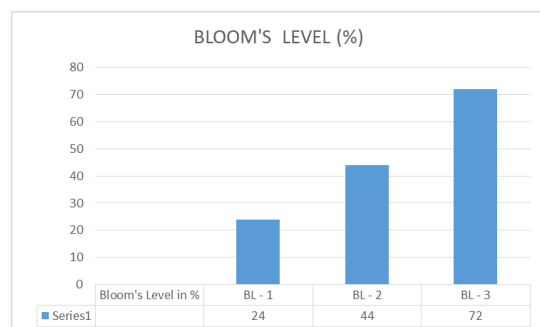
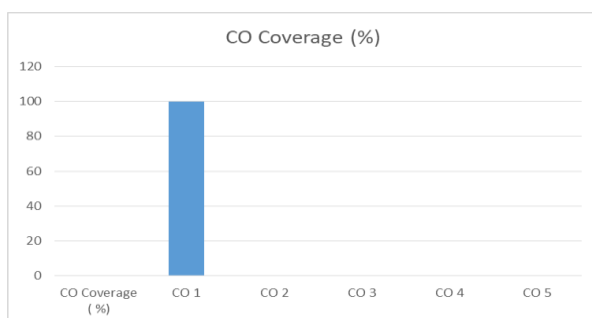
Instructions: Answer any 5

| Q. No | Question   | Marks | BL | CO | PO | PI Code |
|-------|--|-------|----|----|----|---------|
| 1     | CE amplifier is mostly preferred in amplifier circuits because _____<br>a. of low output impedance<br>b. of high output impedance<br>c. it provides better voltage and current gain<br>d. it has better Q-Point        | 1     | 1  | 1  | 1  |         |
| 2     | If the value of $\alpha$ is 0.9, then value of $\beta$ is _____<br>a. 9<br>b. 0.9<br>c. 900<br>d. 90   | 1     | 2  | 1  | 2  |         |
| 3     | What is the current gain for a common-base configuration if, $I_E = 4.2$ mA and $I_C = 4.0$ mA?<br>a. 16.8<br>b. 1.05<br>c. 0.2<br>d. 0.95   | 1     | 3  | 1  | 2  |         |
| 4     | In a voltage divider bias circuit $R_1$ is $4.7\text{ K}\Omega$ , $R_2$ is $1500\Omega$ , and $V_{CC}$ is +18 V. then the voltage across the base resistance is _____<br>a. 8.7 V<br>b. 4.35 V<br>c. 2.9 V<br>d. 0.7 V | 1     | 3  | 1  | 3  |         |

|   |   |   |   |   |   |  |
|---|---|---|---|---|---|--|
| 5   | <p>Which of these are incorrect about Darlington amplifier?</p> <p>a) High input resistance<br/>b) Low output impedance<br/>c) Unity voltage gain<br/>d) It is used as a current buffer</p>   | 1 | 1 | 1 | 1 |  |
| <p align="center"><b>Part – B</b><br/>(2 x 10 = 20 Marks)<br/><b>Instructions: Answer any TWO</b></p> |   |   |   |   |   |  |
| 6.a.  | <p>Calculate the small signal voltage gain of the bipolar transistor circuit shown in Fig A. Assume the transistor and circuit parameters are ; <math>\beta = 100</math>, <math>V_{CC} = 20V</math>, <math>V_{BE} = 0.7</math>, <math>R_C = 6\text{ K}\Omega</math>, <math>R_B = 50\text{ K}\Omega</math>, and <math>V_{BB} = 1.2V</math>. <math>I_{CQ} = 1\text{ mA}</math>, and <math>V_{CEQ} = 6V</math></p>  <p align="center"><b>Fig A</b></p> | 5 | 3 | 1 | 3 |  |
| 6.b.  | <p>Draw the equivalent circuit of the NPN common emitter circuit with an emitter resistor as shown in Fig. B, and derive the expression for the input resistance (<math>R_{ib}</math>) and state the resistance reflection rule.</p>  <p align="center"><b>Fig. B</b></p>  | 5 | 2 | 1 | 2 |  |
| 7.a.  | <p>Determine the small signal current gain of the CB configuration circuit shown in Fig C.</p>  | 5 | 2 | 1 | 3 |  |

|             |  |          |          |          |          |  |
|-------------|--|----------|----------|----------|----------|--|
|             |  <p style="text-align: center;"><b>Fig. C</b></p>   |          |          |          |          |  |
| <b>7.b.</b> | <p>For the common base circuit shown in Fig. B, determine <math>I_C</math> and <math>V_{CB}</math>. Assume the transistor to be of silicon. Given <math>V_{BE} = 0.7 \text{ V}</math>.</p>  <p style="text-align: center;"><b>Fig B.</b></p> | <b>5</b> | <b>3</b> | <b>1</b> | <b>3</b> |  |
| <b>8.a.</b> | Draw the frequency response of an amplifier and give the significance of the 3 dB line in bandwidth calculation  | <b>4</b> | <b>2</b> | <b>1</b> | <b>2</b> |  |
| <b>8.b.</b> | Explain the impact of bypass capacitor in frequency response of an amplifier with necessary diagram  | <b>6</b> | <b>3</b> | <b>1</b> | <b>1</b> |  |

#### Course Outcome (CO) and Bloom's level (BL) Coverage in Questions



## Evaluation Sheet

Name of the Student:

Register No.:

|                                    |    | Part- A ALL FIVE (5x 1= 5 Marks) |                |       |
|------------------------------------|----|----------------------------------|----------------|-------|
| Q. No                              | CO | Marks Allotted                   | Marks Obtained | Total |
| 1                                  | 1  | 1                                |                |       |
| 2                                  | 1  | 1                                |                |       |
| 3                                  | 1  | 1                                |                |       |
| 4                                  | 1  | 1                                |                |       |
| 5                                  | 1  | 1                                |                |       |
| Part- B Any TWO (2 x 10= 20 Marks) |    |                                  |                |       |
| 6.a                                | 1  | 5                                |                |       |
| 6.a                                | 1  | 5                                |                |       |
| 7.a.                               | 1  | 5                                |                |       |
| 7.b.                               | 1  | 5                                |                |       |
| 8.a                                | 1  | 10                               |                |       |

Consolidated Marks:

| CO    | Marks Allotted | Marks Scored |
|-------|----------------|--------------|
| CO1   | 25             |              |
| Total | 25             |              |

**Approved by the Course Coordinator**