

#### 4. Task 1.1: Stiff voltage divider

• **Design the VDB circuit for Stiff Voltage divider**

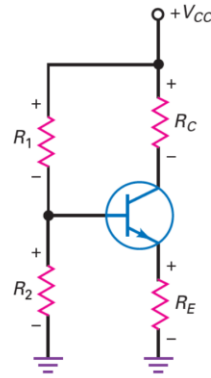
$V_{CC} = 10V$ ,  $V_{CE}$  at midpoint

$I_C = 10mA$

Transistor: 2N3904's  $\beta_{dc} = 100 - 300$

Find all the resistor values and write it down.

Note: For this task, No need to simulate in LT Spice.



$$V_{BB} = V_{CC} \frac{R_2}{R_1 + R_2}$$

$$V_{BB} = V \quad V_{EE} = V_{BB} - V_{BE}$$

$$V_{BE} = 0.7V$$

$$-V_{BB} = V_{EE} + V_{BE}$$

$$= I_E R_E + V_{BE}$$

$$= 10mA \times 100 + 0.7$$

$$= 1.7V$$

$$V_{BB} = V_{CC} \frac{R_2}{R_1 + R_2}$$

$$1.7 = 10 \times \frac{100}{R_1 + 100}$$

$$R_1 + 100 = \frac{1000}{1.7}$$

$$R_1 = 488.24 \Omega$$

**Task 11** → Stiff Voltage divider  
 $V_{CC} = 10V$ ,  $V_{CE}$  at midpoint  
 $I_C = 10mA$   
 $\beta_{dc} = 100 - 300$   
 $V_E = 0.1 V_{CC} = 0.1 \times 10 = 1V$   
 $R_E = \frac{V_E}{I_E}$   
 $I_E \approx I_C \approx 10mA$   
 $R_E \approx \frac{1}{10 \times 10^{-3}} = 100 \Omega$

AIM:

## 4. Task 1.2: Firm Voltage divider

### • Design the VDB circuit for Firm Voltage divider

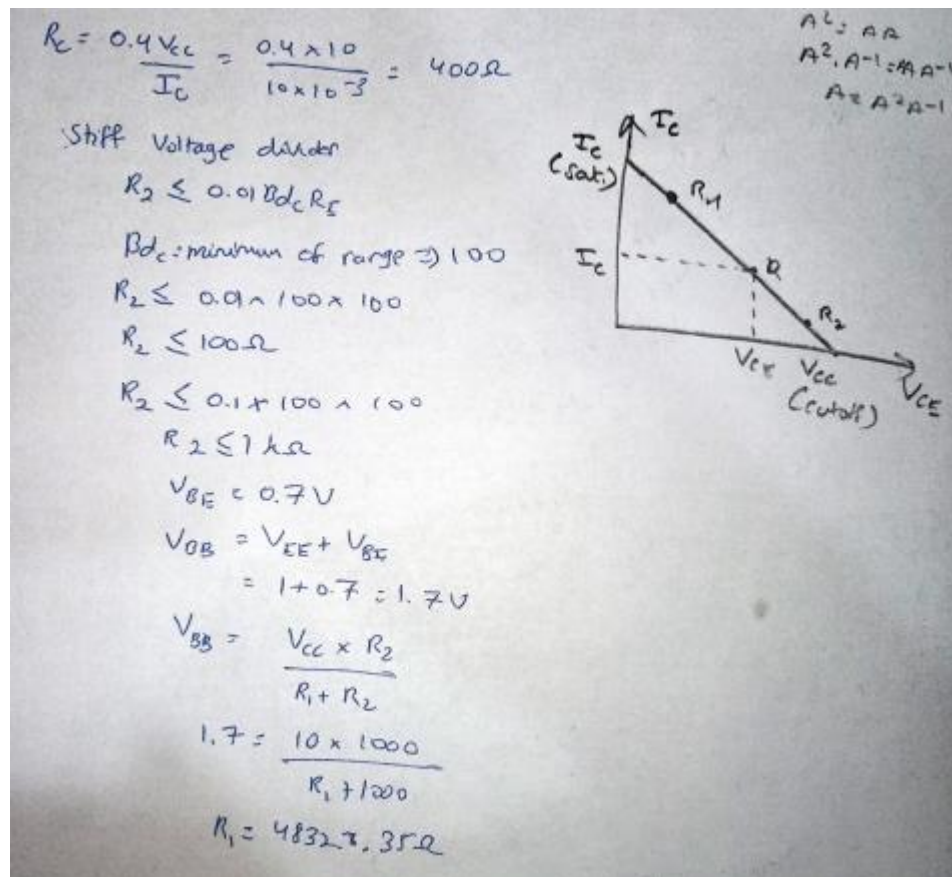
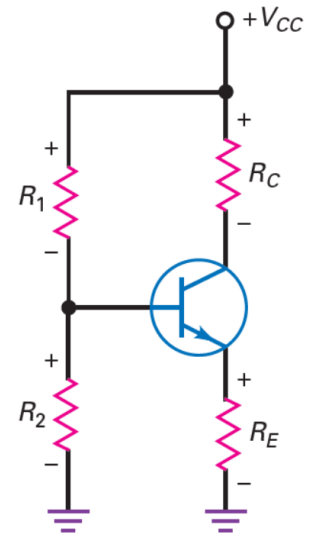
$V_{CC} = 10V$ ,  $V_{CE}$  at midpoint

$I_C = 10mA$

Transistor: 2N3904's  $\beta_{dc} = 100 - 300$

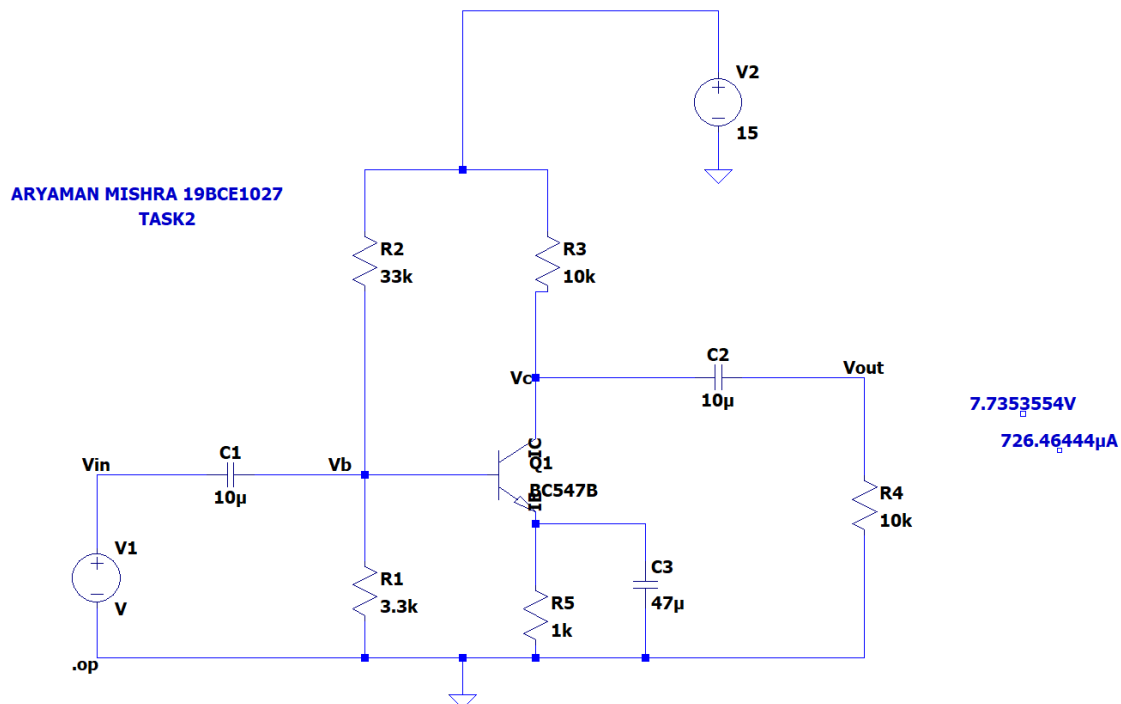
Find all the resistor values and write it down.

Note: For this task, No need to simulate in LT Spice.



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## 8. Task 2: Operating point of the amplifier



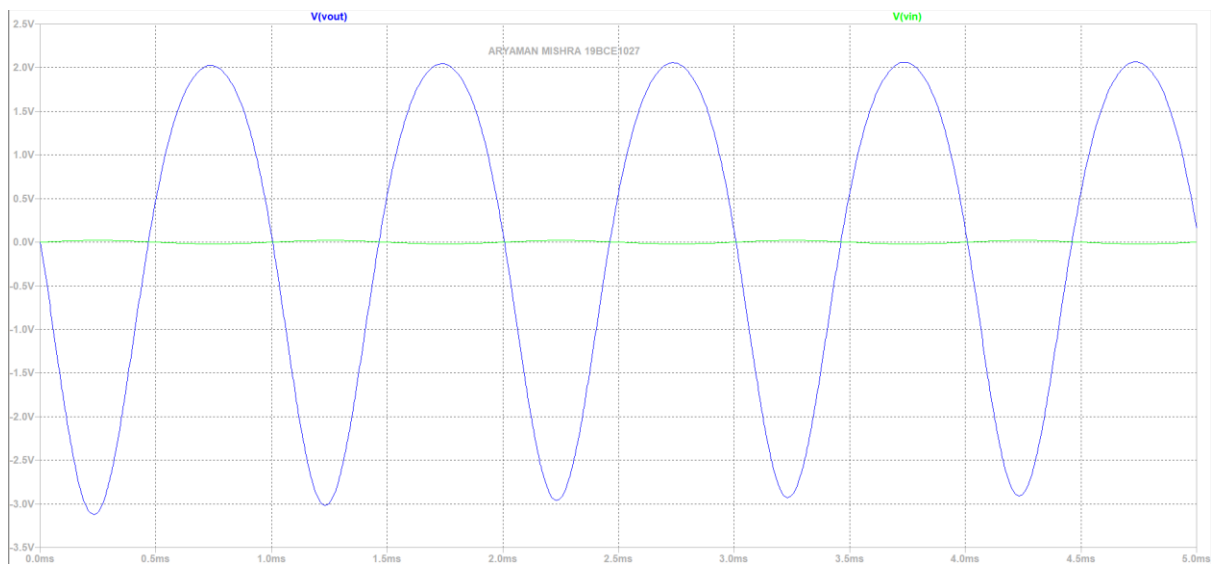
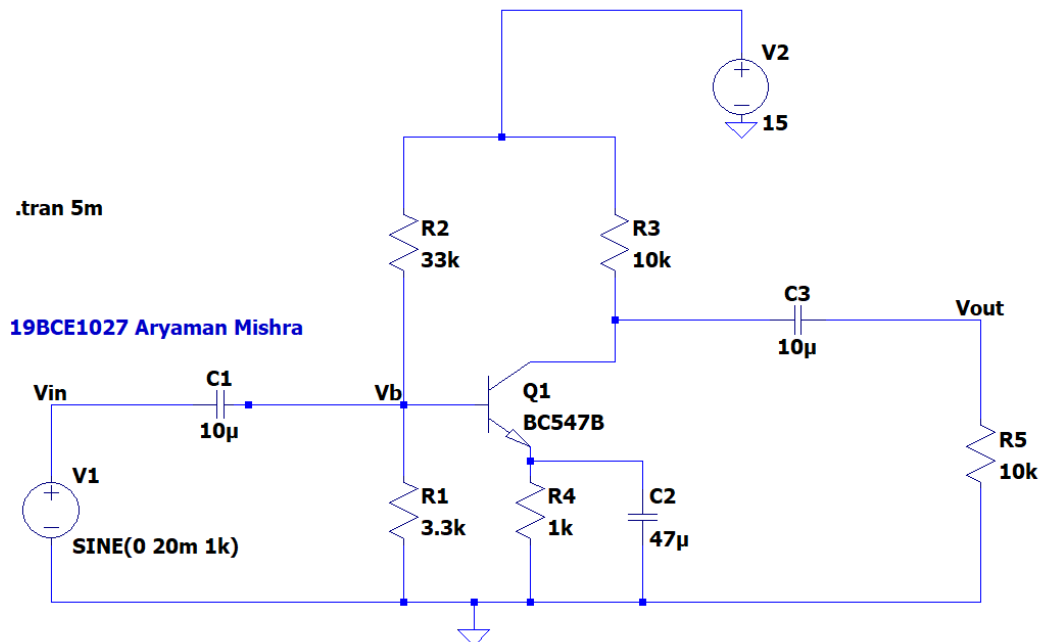
\* C:\Users\aryam\Desktop\Fall Sem 2021\Electronics Hardware Trouble Shooting Lab\Lab 5 6-9-21\Draft1.asc

--- Operating Point ---

|          |               |                |
|----------|---------------|----------------|
| V(vin):  | 0             | voltage        |
| V(vb):   | 1.35665       | voltage        |
| V(n001): | 15            | voltage        |
| V(ic):   | 7.73536       | voltage        |
| V(ie):   | 0.728793      | voltage        |
| V(vout): | 7.73536e-013  | voltage        |
| Ic(Q1):  | 0.000726464   | device_current |
| Ib(Q1):  | 2.3284e-006   | device_current |
| Ie(Q1):  | -0.000728793  | device_current |
| I(C3):   | 3.42533e-017  | device_current |
| I(C2):   | -7.73536e-017 | device_current |
| I(C1):   | 1.35665e-017  | device_current |
| I(R5):   | 0.000728793   | device_current |
| I(R4):   | 7.73536e-017  | device_current |
| I(R3):   | 0.000726464   | device_current |
| I(R2):   | 0.000413435   | device_current |
| I(R1):   | 0.000411106   | device_current |
| I(V2):   | -0.0011399    | device_current |
| I(V1):   | 1.35665e-017  | device_current |

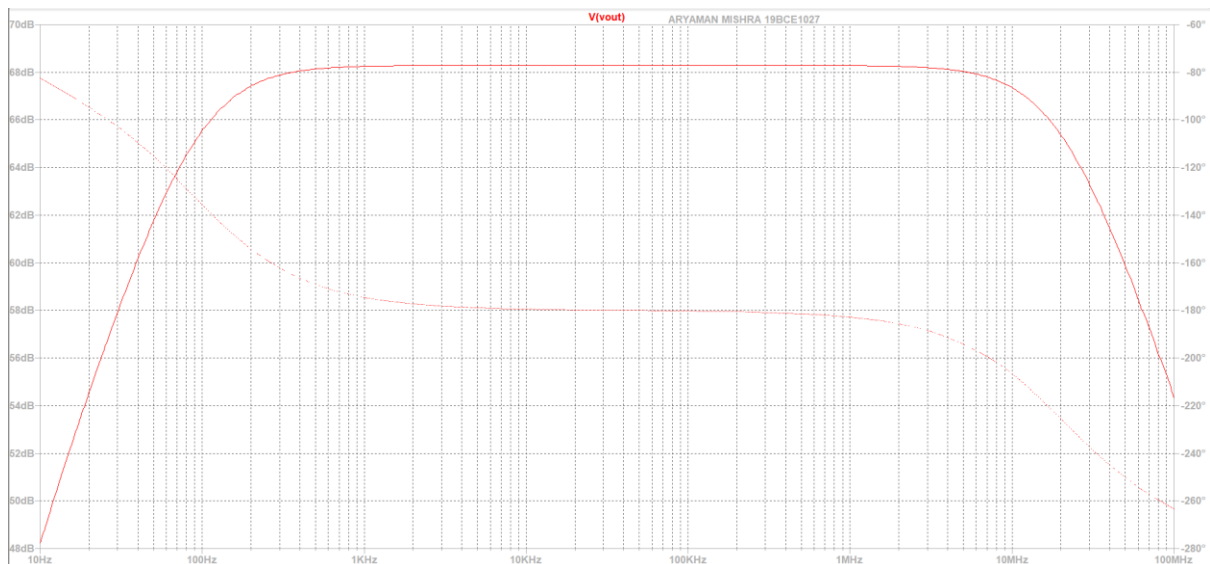
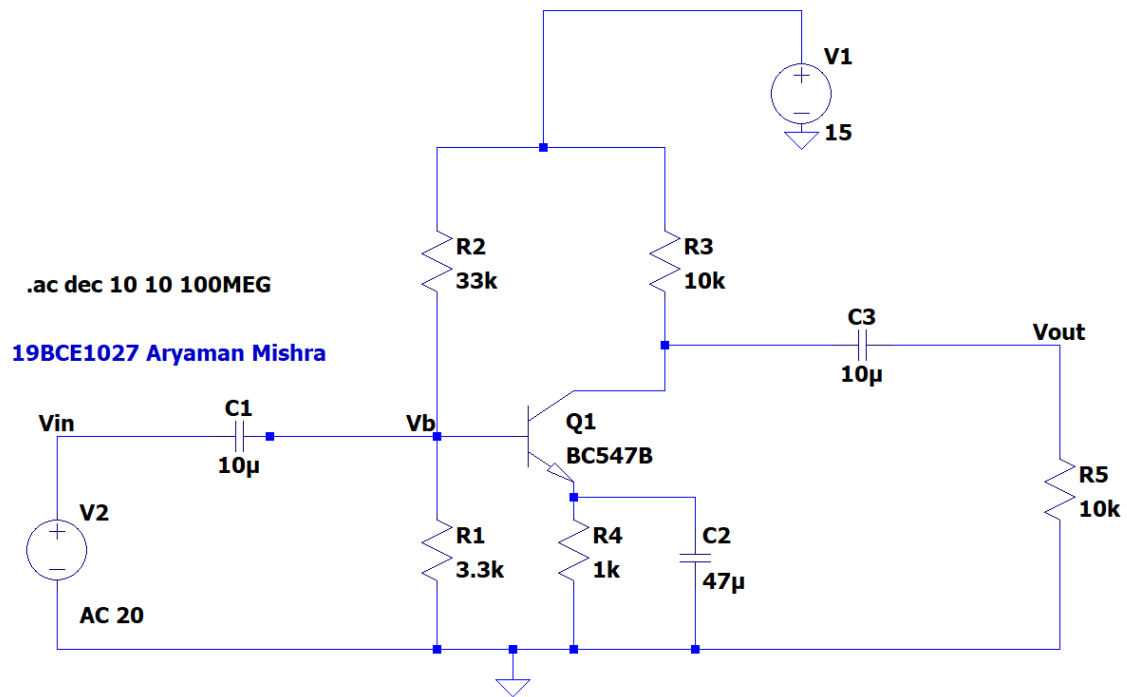
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## 9. Task 3: AC transient analysis



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## 10. Task 4: AC Analysis – Frequency sweep



CONCLUSION: ALL THE TASKS HAVE BEEN SUCCESSFULLY COMPLETED AND EXECUTED.