

1 Answer All

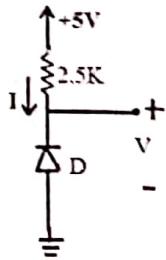
a How many valence electrons does a silicon atom have?

1

a. 0; b. 1; c. 2; d. 4.

b Find the values of I and V in the circuit shown below.

1



c Why fixed bias is so called? Justify.

1

d Derive the relation between α , β ?

1

e Write the differences between a BJT and an FET amplifier?

1

f Given $I_{DSS} = 10$ mA and $V_P = 4$ V, determine I_D when:

1

(a) $V_{GS} = 1.2$ V; (b) $V_{GS} = 2$ V.

g Write the gain of a non-inverting OpAmp configuration.

1

h The output voltage of a certain op-amp circuit changes by 20V in 4 μ s. What is the slew rate?

1

i State the effect of voltage amplifier on input and output impedance.

1

j The open-loop gain of an amplifier is 50 and its bandwidth is 20KHz. When negative feedback is employed, its bandwidth is increased by 5%. Calculate the feedback ratio.

1

2 Answer any One

a A full-wave bridge rectifier with a 120V RMS sinusoidal input has a load resistor of 1K Ω .

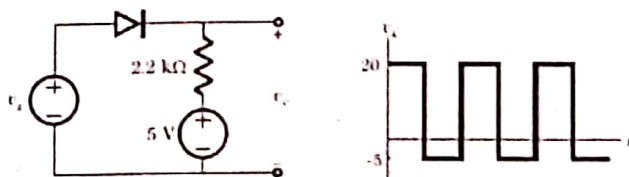
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a) If silicon diodes are applied, what is the d.c. voltage available at the load?

b) Determine the PIV rating of each diode.

b For the given circuits and input waveform, determine the output waveform.

3

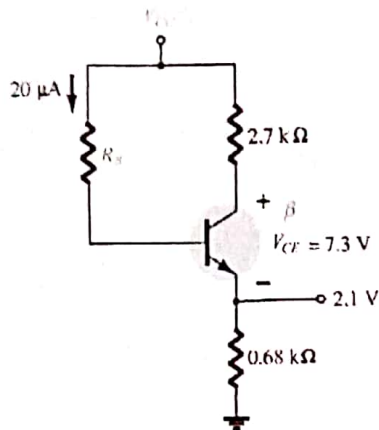


[P. T. O]

3 Answer any One

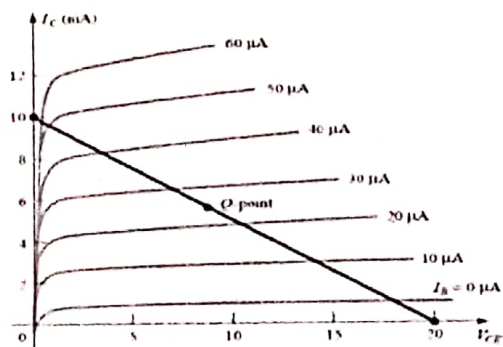
- a Given the information provided in the figure shown below, determine V_C , I_C , and V_{CC} .

3



- b From the given figure, determine the required values of V_{CC} , R_C , and R_B for a fixed-bias configuration.

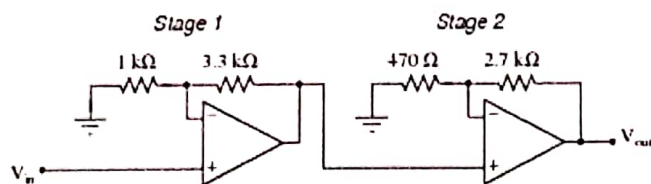
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4 Answer any One

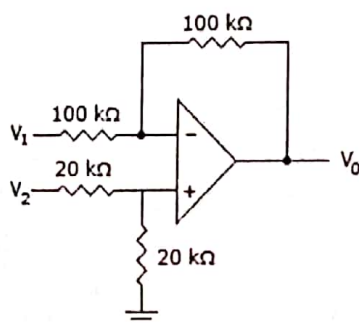
- a Calculate the voltage gain for each stage of this amplifier circuit (both as a ratio and in units of decibels), then calculate the overall voltage gain:

3



- b Determine the output voltage when $V_1 = V_2 = 1$ V.

3



[P. T. O.]

5 Answer any One

- a Given a Q-point of $I_{DQ} = 3 \text{ mA}$ and $V_{GS,Q} = 3 \text{ V}$, determine the value of I_{DSS} if $V_P = 6 \text{ V}$. 3
- b An N-Channel depletion MOSFET has the following two points on its $V_{GS} - I_D$ curve. 3
- (i) $V_{GS} = 0$ at $I_D = 12 \text{ mA}$ and (ii) $V_{GS} = -6 \text{ V}$ at $I_D = 0$.
- Find out the I_{DSS} and V_P . What is the value of I_D when $V_{GS} = -3 \text{ V}$.

6 Answer any One

- a Explain the principle of an oscillator circuit. Mention the requirements to be satisfied to build an oscillator circuit. 3
- b Explain how input impedance, output impedance, voltage gain, and bandwidth changes when negative feedback is introduced in an amplifier circuit. 3

7 Answer any Two



Discuss the above circuit with sinusoidal input of peak to peak voltage of 10 V , $V_{R1} = 2 \text{ V}$, $V_{R2} = 1 \text{ V}$, $R = 1 \Omega$, and the diodes are silicon diodes.

- b A crystal diode having an internal resistance of $r_f = 20 \Omega$ is used for full-wave rectification. If the applied voltage is $V = 50 \sin 2t$ and the load resistance is $R_L = 800 \Omega$, determine the following 6
- a) I_m , I_{dc} , I_{rms} of output.
- b) Ripple factor
- c A full-wave center tap rectifier uses two crystal diodes each having a forward resistance of 22 ohms . The RMS value of secondary voltage fed between center tap to each end of secondary is 52 V and the load resistance is $2.2 \text{ k}\Omega$. Find 6
- (i) mean load current (ii) d.c. output voltage (iii) d.c. output power
- (iv) rectification efficiency (v) peak inverse voltage

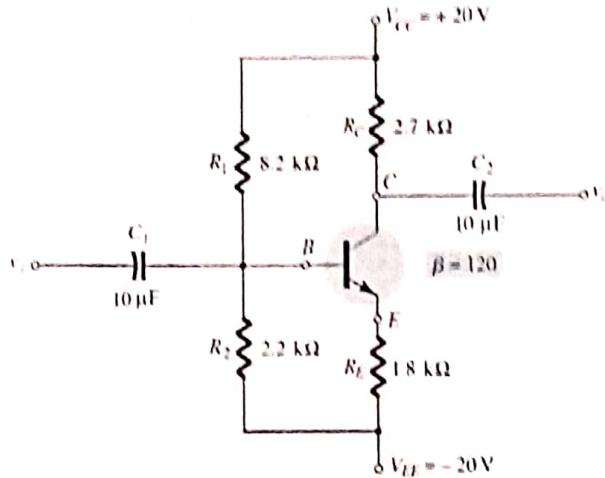
8 Answer any One

- a Determine the following for the fixed-bias configuration with $V_{cc} = 12 \text{ V}$, $R_C = 2.2 \text{ k}\Omega$, $R_B = 240 \text{ k}\Omega$, $\beta = 50$. 6
- (a) I_{BQ} and I_{CQ} ;
- (b) V_{CEQ} ;
- (c) V_B and V_C ;
- (d) V_{BC} .

[P. T. O]

b Determine V_C and V_B for the circuit shown below.

6



9 Answer any One

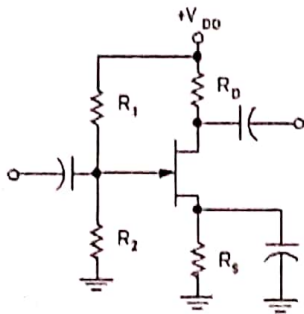
a Explain CMOS as an INVERTER with a suitable diagram. Implement NOT gate using CMOS and describe its operation.

6

b Determine the following parameter for the network given below using the graphical method. Given that $R_1=2.1\text{M}\Omega$, $R_2=270\text{K}\Omega$, $R_D=2.4\text{K}\Omega$, $R_S=1.5\text{K}\Omega$, $I_{DSS}=8\text{mA}$, $V_P=-4\text{V}$, $V_{DD}=16\text{V}$.

6

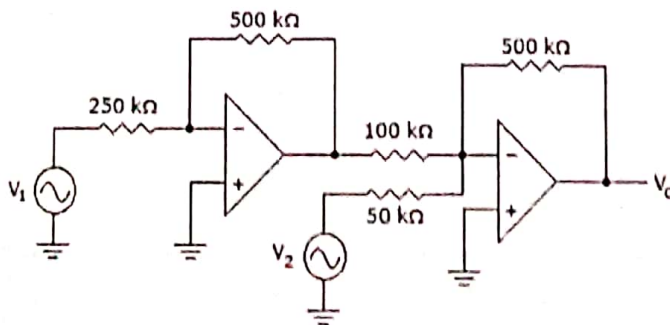
(a) I_{DQ} and V_{GSQ} , (b) V_D , (c) V_S , (d) V_{DS} , (e) V_{DG} .



10 Answer any One

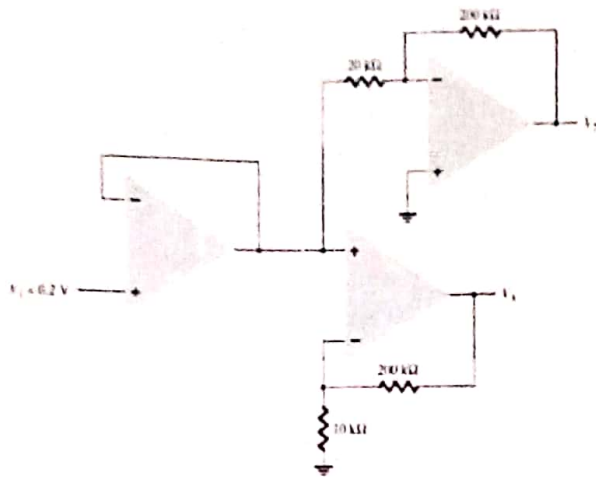
a What do you mean by Op-amp? Determine the output voltage in terms of V_1 and V_2 .

6



[P. T. O]

b Determine the output voltage V_2 and V_3 of the given circuit.



11 Answer any One

- a Discuss the voltage series feedback amplifier with a suitable diagram. What are the advantages of a Negative Feedback Amplifier? 5
- b What is the condition for oscillation? Derive the expression of frequency of oscillation and also the condition for oscillation in an RC phase shift oscillator 5
