

B.E. ELECTRONICS AND TELE-COMMUNICATION ENGINEERING
2ND YEAR 1ST SEMESTER SUPPLEMENTARY EXAM, 2018

ANALOG CIRCUITS- I

Time: Three hours

Full Marks: 100

Use a separate Answer-Script for each Part

PART-I (50 MARKS)

Answer *Q.1*, any *two* from *the rest*

[10+2×20=50]

1. a) Explain the detrimental consequence of Miller effect associated with common source MOS amplifier. Explain the operation of a cascode amplifier. [5+5]
2. a) With the help of small signal equivalent circuit calculate and compare voltage gain, input impedance and output impedance of Common Source and Common Gate amplifier. [20]
3. a) List and explain basic building blocks of an OPAMP. Explain why open loop OPAMP is not suitable as linear applications. Why negative feedback is required for amplifier operation. [5+2+3]
- b) Write the important features of Instrumentation amplifier (IA). Draw and explain the circuit of IA whose gain is controlled by an adjustable resistor. [5+5]
4. a) Why do we use higher order filters? Define 2nd order low and high pass filters. [2+3]
- b) Explain why a narrow band pass filter can't be designed by cascading one LPF and one HPF. [4]
- c) Define Bessel, Butterworth and Chebyshev filters and compare their frequency response. [6]
- d) Design a 2nd order Butterworth high pass filter with cut off frequency of 1 KHz. Given that C= 0.1 μF. Draw the frequency response. (Qualitative hand drawing). [5]
5. Short note
 - a) Differential Amplifier Circuit using BJT
 - b) Voltage divider bias of BJT [4×5=20]

[Turn over

PART- II
(Answer any Five Questions)

1. Explain the working principle of a voltage multiplier with proper circuit diagram. [Marks: 10]
2. Explain the working principle of a half wave rectifier. Find V_{dc} , V_{rms} and efficiency(η) of a half wave rectifier. [Marks: 10]
3. Find the output voltage V_o of the diode circuit shown below and plot the output voltage for a temperature range 0 to 100°C. [All diodes are real and identical] [Marks: 6+4=10]

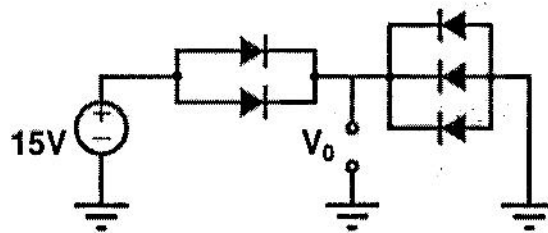


Figure 1

4. A) Draw the output waveform of the circuit shown below. ($V_{B1} = 2V$, $V_{B2} = 3V$ and diodes are real)
B) Determine the minimum or maximum value of V_{B1} and V_{B2} to avoid the clipping of output waveform. [Marks: 6+4=10]

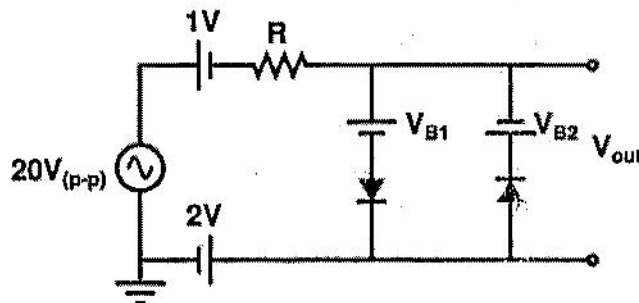


Figure 2

5. Determine the expression of stability factor $S(I_{co})$ for a voltage divider network. [Marks: 10]
6. Explain the function of a current mirror circuit. Design one current mirror with $1\mu A$ current in primary branch and $0.75\mu A$ in secondary branch. (Available transistors are identical with $\beta = 1000$ and $V_{BE} = 0.7V$. Supply voltage 3V)

7. One CE amplifier with proper biasing arrangement is shown below. Find the following parameters: [$\beta = 100$, $C_E = C_C = C_B = 1 \mu F$ and neglect r_o]

- A) All low frequency poles and zeros due to coupling capacitor and lower cut-off frequency.
 B) Gain versus frequency plot (for very low to mid frequency range) [Marks: 7+3=10]

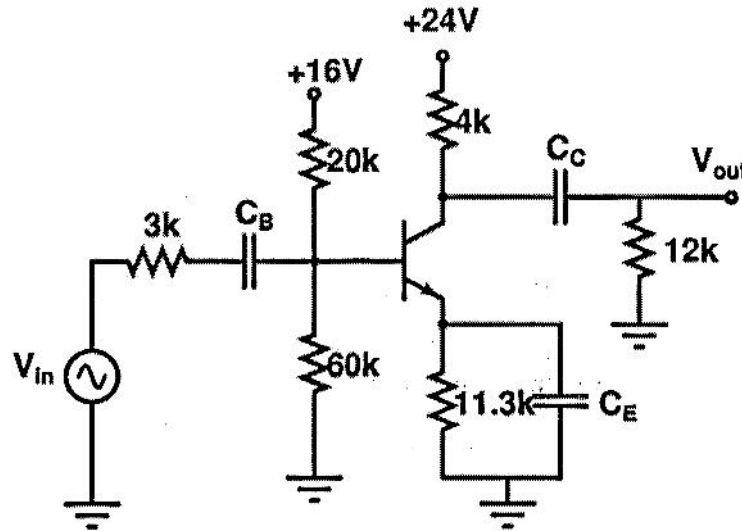


Figure 3