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ROLL No: | | | | | | | | | | | | | Total number of pages:[2]

Total number of questions: 06

B.Tech. || ECE || 3rd Sem

Analog Devices & Circuits

Subject Code:BTEC-302A

Paper ID: (for office use)

Time allowed: 3 Hrs Max Marks: 60

Important Instructions:

- All questions are compulsory
- Assume any missing data

PART A (2×10)

Q.1

i. What do you mean by reverse recovery time of diode?
ii. Explain the role of heat sink in a transistor.
iii. What is thermal runway of BJT?
iv. What do you mean by peak inverse voltage of a diode?
v. Which diode can be used as variable capacitor and how?
vi. Draw the circuit diagram of fixed biasing.
vii. What is stability factor?
viii. How does the trans-conductance vary with drain current of a MOSFET?
ix. What is Barkhausen's Criteria?
x. Give the difference between low frequency model and high frequency model of a transistor.

PART B (8×5)

Q.2 a. Can two back to diodes be used as transistor? Justify the answer. 4

b. Give the difference between avalanche and Zener breakdown. 4

OR

a. Draw and explain the energy band diagrams for a PN junction diode when diode at equilibrium, forward biased and reversed biased condition. 4

b. Explain with neat diagram, the working of Metal oxide field effect transistor (MOSFET). Also derive the equation for the drain current of NMOS transistor. 4

Q.3 a. Draw and explain the circuit diagram of potential divider biasing technique using BJT. Also derive the equation for its stability factor. 4

b. Given the information provided in Figure 1, determine the following: 4

i. β
ii. V_{cc}
iii. R_B

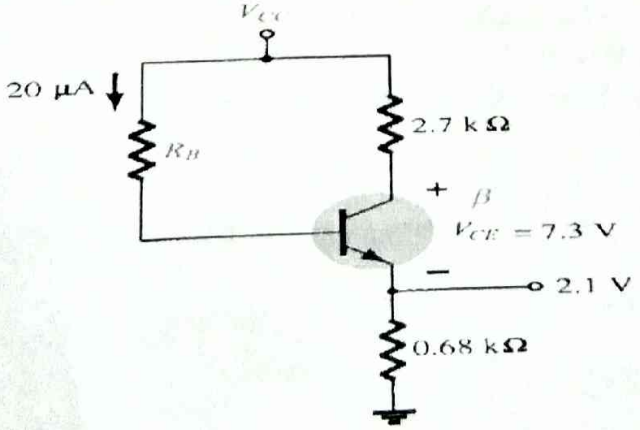

Figure 1

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OR

a. Assume that a silicon transistor with $\beta_0=50$, $V_{be}=0.6V$ and $V_{cc}=20V$ and $R_c=4.7k\Omega$ is used in a self-biased circuit. It is desired to establish a Q point at $V_{ce}=8V$ and $I_c=2mA$ and stability factor S is less than equal to 5.0. Design the circuit with all component values. 3

b. Draw and explain the working of field effect transistor (FET). Also explain its characteristics.

Q.4. a. Draw and explain the push-pull power amplifier. 4

b. Draw and explain the working of transformer coupled audio amplifier. Also draw its frequency response. 4

OR

a. Draw and explain the complimentary push-pull power amplifier. 4

b. For the circuit of Figure 2, calculate the input power, output power, and power handled by each output transistor and the circuit efficiency for an input of 12 V rms. 4

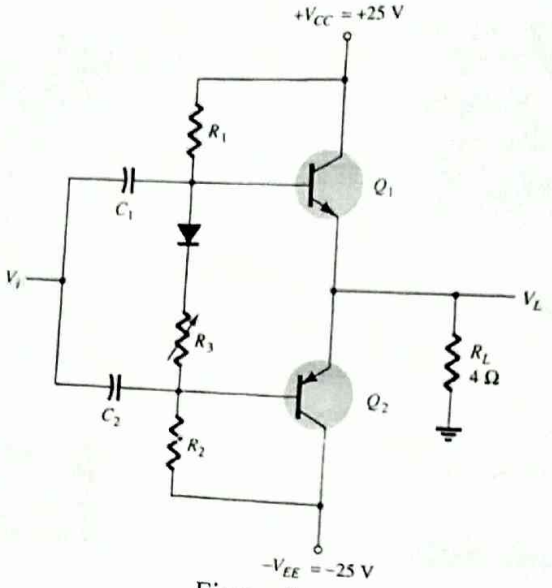

Figure 2

Q.5 a. Draw the circuit arrangement for current series feedback. Also derive the equation for gain of the circuit. 4

b. Draw and explain the working principle of Wein Bridge oscillator. Derive the equation for output frequency. 4

OR

a. Draw and explain the working principle of RC phase oscillator. Derive the equation for output frequency. 4

b. Colpitt oscillator is designed with $C_1=100pF$ and $C_2=7500pF$. The inductance is variable. Determine the range of the inductor if the frequency of oscillation is to vary between 900kHz and 2000kHz. 4

Q.6 Derive the transistor amplifier circuit performance in h-parameters using CE configuration. 8

OR

a. The overall gain of emitter follower circuit is unity. Justify your answer with analytical equations. 4

b. Draw and explain the four basic feedback configurations. 4