

SE204 - Analog Circuits

P. Pages : 3

Time : Three Hours

**GUG/W/23/13914**

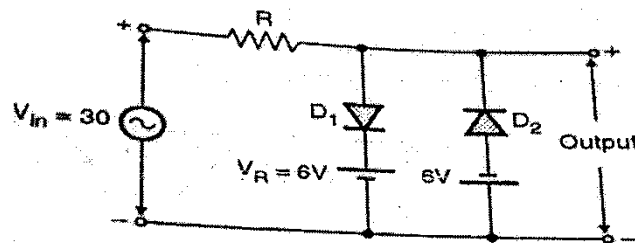
Max. Marks : 80

- Notes :
1. All questions carry as indicated marks.
 2. Assume suitable data wherever necessary.
 3. Illustrate your answers wherever necessary with the help of neat sketches.

1. a) What is clipper? Draw and explain operation of combinational clipper with its input and output waveform. **8**
 b) A given transistor with $I_C = 10\text{mA}$, $V_{CE} = 10\text{V}$ and at room temperature has the following set of low frequency parameters.
 $h_{ie} = 500\Omega$, $h_{oe} = 10^{-5} \text{ A/V}$, $h_{fe} = 100$, $h_{re} = 10^{-4}$, $V_T = 25\text{mV}$.
 Find the values of all the hybrid Pi parameters of a low frequency model. **8**

OR

2. a) Identify the following circuit shown in fig. Draw the input and output waveform and explain its operation. **8**

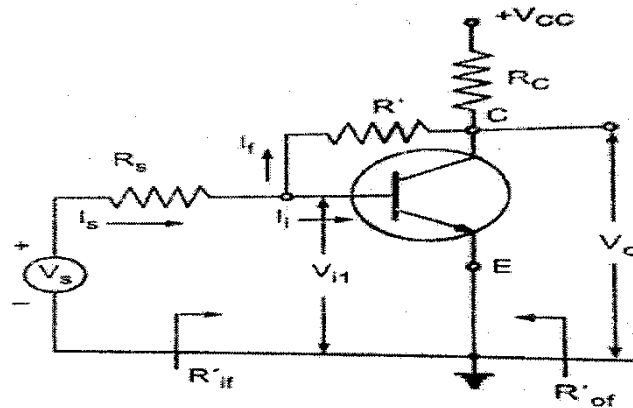


- b) Explain the significance of all components of small signal low frequency hybrid Pi model with its circuit diagram. **8**
3. a) The loudspeaker of 8Ω is connected to the secondary of the output transformer of a class A amplifier circuit. The quiescent collector current is 140 mA . The turn's ratio of transformer is 3:1. The collector supply voltage is 10V . If ac power delivered to the loudspeaker is 0.48 watt . Calculate. **8**
 i) AC power delivered to load voltage.
 ii) RMS value of load voltage.
 iii) RMS value of primary voltage.
 b) Derive the input and output resistance of shunt derived shunt fed negative feedback amplifier. **8**

OR

4. a) With the help of neat circuit diagram and suitable waveform of class A power amplifier derive the expression for following. 8
- I_{CQ} and V_{CQ}
 - DC input power P_{DC}
 - AC output power P_{AC}
 - % Maximum Efficiency.

- b) Identify which feedback is used in the following circuit and state its effect on voltage gain, input resistance, output resistance and harmonic distortion. 8



5. a) Draw the circuit diagram and its waveform of free- running multivibrator and explain its operation. 8
- b) A Hartley oscillator is designed with $L_1 = 2\text{mH}$, $L_2 = 20\mu\text{H}$ and a variable capacitance. Determine the range of capacitance values, if the frequency of oscillation is varied between 950kHz to 2050kHz. 8

OR

6. a) Draw the electrical equivalent circuit of the quartz crystal oscillator and explain its operation with the expression of series and parallel resonant frequency. 8
- b) In UJT relaxation oscillator $n=0.62$, $R=5\text{ K}\Omega$ and $C=0.05\text{ }\mu\text{F}$ Calculate period and frequency of oscillation. List the factor affecting frequency in case of UJT relaxation oscillator. 8
7. a) Draw the circuit diagram of emitter coupled dual input balance output differential amplifier and obtain its d.c. analysis. 8
- b) Explain the block diagram of internal construction of op-amp and state the function of each block in details. 8

OR

8. a) Define. 8
- PSRR
 - Input bias Current
 - Slew rate
 - Input offset current.

- b) The following specification are given for the dual input balance output differential amplifier $R_c = 2.2\text{ k}\Omega$, $R_E = 4.7\text{ k}\Omega$, $R_{in1} = R_{in2} = 50\Omega$, $V_{CC} = 10\text{V}$, $V_{EE} = 10\text{V}$ and the transistor with $\beta_{dc} = \beta_{ac} = 100$. 8

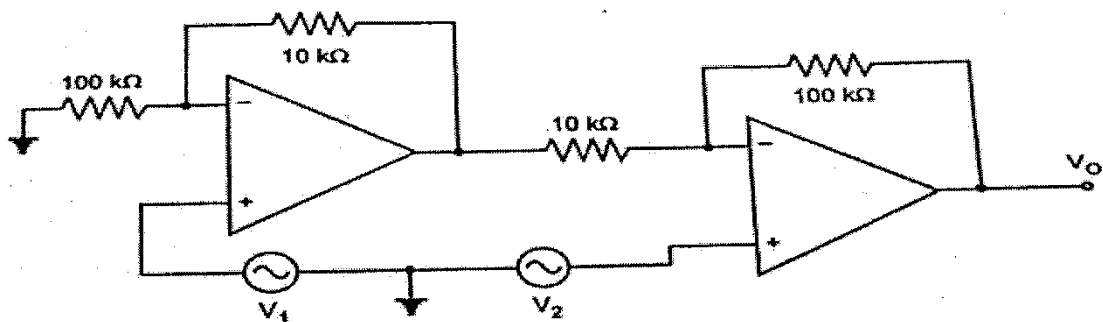
Determine.

- | | |
|-----------------------------|---|
| i) I_{CQ} and V_{CEQ} . | ii) Differential voltage gain (A_d) |
| iii) Input resistance. | iv) Output resistance. |

9. a) Explain the working of inverting summing amplifier with its output expression. 8
- b) What is an active integrator? With neat circuit diagram and waveform explain the working of an active integrator. 8

OR

10. a) Assuming the op-amp used as ideal in the circuit shown in following circuit. Calculate the output voltage V_O of the circuit in terms of the inputs V_1 and V_2 . 8



- b) Draw and explain the operation of second order high pass active filter. Also draw its frequency response graph. 8
