

Third Semester B.E. Degree Examination, Dec.2019/Jan.2020
Analog Electronics Circuits

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Draw a double ended clipper circuit and explain the working principle with transfer characteristics. (10 Marks)
- b. Draw and explain the working of clamper circuit which clamps the positive peak of a signal to zero. (10 Marks)

OR

- 2 a. Derive the expression for stability factors S' and S'' for fixed bias circuit. (08 Marks)
- b. A voltage divider biased circuit has $R_1 = 39K\Omega$, $R_2 = 82K\Omega$, $R_C = 3.3K\Omega$, $R_E = 1K\Omega$ and $V_{CC} = 18V$. The silicon transistor used has $\beta = 120$. Find Q-point and stability factor. (07 Marks)
- c. Explain the operation of transistor as switch with suitable circuit and necessary waveforms. (05 Marks)

Module-2

- 3 a. State and prove Millers theorem. (06 Marks)
- b. Compare the characteristics of CB, CE and CC configurations. (06 Marks)
- c. For the collector feedback configuration having $R_F = 180K\Omega$, $R_C = 2.7K\Omega$, $C_1 = 10\mu F$, $C_2 = 10\mu F$, $\beta = 200$, $r_0 = \infty\Omega$ and $V_{CC} = 9\text{volts}$. Determine the following parameters:
i) r_e ii) z_i iii) z_o iv) A_v (08 Marks)

OR

- 4 a. Derive suitable expression to explain the effect of cascading of amplifiers on lower and upper cut off frequencies. (08 Marks)
- b. Derive equations for miller input capacitance and miller output capacitance. (08 Marks)
- c. A transistor in CE mode has h-parameters $h_{ie} = 1.1K\Omega$, $h_{re} = 2 \times 10^{-4}$, $h_{fe} = 100$ and $h_{oc} = 25\mu A/V$. Determine the equivalent CB parameters. (04 Marks)

Module-3

- 5 a. Derive expression for Z_i and A_i for a Darlington Emitter follower circuit. (10 Marks)
- b. Explain the need of a cascading amplifier. Draw and explain the block diagram of two stage cascade amplifier. (06 Marks)
- c. Write a note on cascade amplifier. (04 Marks)

OR

- 6 a. List the general characteristics of negative feedback amplifier. (04 Marks)
b. A given amplifier arrangement has the following voltage gain $AV_1 = 10$, $AV_2 = 20$ and $AV_3 = 40$. Calculate the overall voltage gain and determine the total voltage gain in dBS. (08 Marks)
c. For the voltage series feedback amplifier. Derive an expression for output impedance (Resistance). (08 Marks)

Module-4

- 7 a. Show that maximum efficiency of class-B push pull amplifier (power amplifier) circuit is 78.54%. (08 Marks)
b. Explain the classification of power amplifier with a neat circuit diagram and waveforms. (07 Marks)
c. A class-B push pull amplifier operating with $V_{CC} = 25V$ provides a 22V peak signal to 8Ω load. Calculate the circuit efficiency and power dissipated per transistor. (05 Marks)

OR

- 8 a. Draw the circuit of wein bridge oscillator and explain its operation. (10 Marks)
b. With a neat circuit diagram and waveform, explain the working principal of crystal oscillator operating in series resonant mode. A crystal has the following parameters $L = 0.334H$, $C = 0.065pF$ and $R = 5.5K\Omega$. Calculate its resonant frequency. (10 Marks)

Module-5

- 9 a. With the help of neat diagram, explain the working and characteristics of N-channel JFET. (10 Marks)
b. For a self bias JFET circuit, $V_{DD} = +12V$, $R_D = 2.2K\Omega$, $R_G = 1M\Omega$, $R_S = 1K\Omega$, $I_{DSS} = 8mA$, $V_P = -4$ Volts. Determine the following parameters: i) V_{GS} ii) I_D iii) V_{DS} iv) V_S v) V_G vi) V_D (10 Marks)

OR

- 10 a. With neat sketches, explain the operation and characteristics of n-channel depletion type MOSFET. (10 Marks)
b. Derive expression for V_{GS} , I_D , V_{DS} , V_D and V_S for a voltage divider bias circuit using FET. (10 Marks)