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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
THIRD SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018

Course Code: EC205

Course Name: ELECTRONIC CIRCUITS (EC, AE)

Max. Marks: 100

Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks.

Marks

- 1 a) Define stability factor for leakage current and derive its general expression. Derive the expression for stability factor for leakage current of emitter stabilized biasing circuit. (8)
- b) Draw the small signal low frequency hybrid π model for common emitter configuration. Derive the expression for voltage gain, input and output impedance. (7)
- 2 a) Derive the condition that must be satisfied by a RC circuit to behave as a integrator. Design an integrator circuit to integrate a square wave of 2KHz frequency. (5)
- b) Sketch the response of a RC high pass circuit to a pulse input if $RC \gg t_p$ and $RC \ll t_p$. (3)
- c) Determine the bias voltage V_{CE} , current I_C and stability factor S_{ICO} for the voltage divider configuration with $V_{CC}=20V$, $V_{BE}=0.7V$, $R_1=30K$, $R_2=4K$, $R_C=3K$, $R_E=0.5K$ and $\beta=120$. (7)
- 3 a) Calculate the small signal voltage gain, input impedance and output impedance of emitter follower having $R_1=50K$, $R_2=10K$, $R_E=2K$, $R_S=0.5K$, $V_{CC}=15V$, $V_{BE}=0.7V$, $V_A=80V$ and $\beta=50$ (8)
- b) Using hybrid π model, obtain the expression for input impedance, output impedance and mid band voltage gain of a common emitter amplifier. (7)

PART B

Answer any two full questions, each carries 15 marks.

- 4 a) With neat diagram explain cascode amplifier and its main characteristics. (7)
- b) Explain shunt - shunt feedback topology with neat diagram. Derive the expression for net input and output impedance. (8)
- 5 a) With the small signal high frequency hybrid π model of a common emitter amplifier without bypass capacitor and derive the expression for upper cut off (8)

frequency.

- b) With neat diagram derive the expression for frequency of oscillation of RC phase shift oscillator. (7)
- 6 a) Derive the expression for upper cut off frequency of a common base amplifier using high frequency hybrid π equivalent model. (8)
- b) Draw the circuit of Colpitts oscillator and outline its working principle. (7)

PART C

Answer any two full questions, each carries 20 marks.

- 7 a) With neat diagram explain the working of astable multivibrator. Derive the expression for time period of the astable multivibrator. (10)
- b) With neat diagram explain how voltage regulation is achieved in series voltage regulator. (10)
- 8 a) Explain class A power amplifier. Show that the maximum conversion efficiency of the transformer coupled class A power amplifier is 50%. (10)
- b) Determine drain to source voltage of a MOSFET common source circuit using voltage divider bias and source is directly grounded. Given that $V_{DD}=10V$, $R_1=10M\Omega$, $R_2=10M\Omega$, $R_D=2K\Omega$, $V_t=2V$, and $I_D=2mA$. State which region, the MOSFET is working in the circuit with supportive computations. (7)
- c) Determine g_m for enhancement type MOSFET if $V_{GS(th)}=3V$ and it is biased at $V_{GSQ}=8V$. Assume $k=0.3 \times 10^{-3} mA/V^2$. (3)
- 9 a) With neat diagram explain Schmitt trigger. (7)
- b) What is meant by cross over distortion. How it is eliminated. (3)
- c) Derive expression for voltage gain, input impedance and output impedance of Enhancement MOSFET drain feedback configuration. (10)
