

Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**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  $\pi$  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 an 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  $\pi$  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  $\pi$  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  $\pi$  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  $I_D=2\text{ mA}$ . 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  $k=0.3 \times 10^{-3} \text{ mA/V}^2$ . (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)

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