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# APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY THIRD SEMESTER B.TECH DEGREE EXAMINATION(S), MAY 2019

**Course Code: EC205** 

# **Course Name: ELECTRONIC CIRCUITS (EC,AE)**

Max. Marks: 100

**Duration: 3 Hours** 

### PART A

#### Marks Answer any two full questions, each carries 15 marks.

- a) Define stability factor for  $\beta$  variation. Derive the expression for stability factor for 1 (7)leakage current of voltage divider biasing circuit.
  - b) Using hybrid  $\pi$  model, obtain the expression for input impedance, output (8) impedance and mid band voltage gain of a common collector amplifier.
- 2 a) Derive the condition that must be satisfied by a RC circuit to behave as a (5) differentiator. Design a differentiator circuit to differentiator a square wave of 2KHz frequency.
  - b) Sketch the response of a RC low pas circuit to a pulse input if RC>> t<sub>p</sub> and RC<< (3)t<sub>p</sub>.
  - c) Draw a two stage CE cascade amplifier. Derive an expression for its input (7)resistance, output resistance and voltage gain.
- 3 a) Draw the circuit of CE voltage amplifier with potential divider bias .Mention use (7)of each component in it. What do you mean by half power points in its frequency response?
  - b) Calculate the small signal voltage gain, input impedance and output impedance of (8) common emitter amplifier having R<sub>1</sub>=56K, R<sub>2</sub>=15K, R<sub>C</sub>=2K, R<sub>E</sub>=1K, R<sub>S</sub>=0.5K,  $V_{CC}=20V$ ,  $V_{BE}=0.7V$ ,  $V_A=\infty$  and  $\beta=50$

## PART B

# Answer any two full questions, each carries 15 marks.

- 4 a) Draw the high frequency hybrid  $\pi$  equivalent model of BJT. Derive an expression (5) for short circuit gain
  - b) Outline Millers Theorem in a two port electrical circuit. (3)
  - c) Explain series series feedback topology with neat block diagram. Derive the (7)expression for net input and output impedance.
- 5 a) Draw the small signal high frequency hybrid  $\pi$  model of a common emitter (8)

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amplifier with bypass capacitor and derive the expression for upper cut off frequency.

- b) With neat diagram derive the expression for frequency of oscillation of wien (7) bridge oscillator.
- 6 a) Derive the expression for upper cut off frequency of a common collector amplifier (8) using high frequency hybrid  $\pi$  equivalent model.
  - b) Explain Hartley oscillator with neat diagram. (7)

#### PART C

## Answer any two full questions, each carries20 marks.

- 7 a) With neat diagram explain the working of monostable multivibrator. Derive the (10) expression for period of the monostable multivibrator.
  - b) What are the factors affecting the variation in output voltage of voltage regulator? (10)
    With a circuit diagram, explain how load and line regulations are achieved in a shunt voltage regulator.
- 8 a) Explain class B power amplifier. Show that the maximum conversion efficiency of (7) the idealized class B push pull amplifier is 78.5%
  - b) Determine W/L ratio of a MOSFET amplifier which is biased in such a way that (8)  $V_{GSQ}=2V$ , Vt= 1V and  $\mu C_{ox} = 0.3 \text{ mA/V}^2$  for a drain current 2mA.
  - c) Determine  $g_m$  for enhancement type MOSFET if Vt= 3V and it is biased at (5) V<sub>GSQ</sub>=8V. Assume  $\mu C_{ox}$  W/L=0.2x10<sup>-3</sup>mA/V<sup>2</sup>
- 9 a) With neat diagram explain bootstrap sweep circuit. Derive an expression for its (8) retrace period.
  - b) How even harmonics are eliminated in push pull operation of power amplifiers? (4)
  - c) Derive expression for voltage gain and output impedance for a common source (8) amplifier using small signal model in mid frequency.

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