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 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>> tp and RC<< tp. (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 β=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 β=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=10MΩ, R_2=10MΩ, R_D=2KΩ, Vt= 2V, and I_D= 2 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=0.3x10^{-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)

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Reg No.:_____ Name:_____

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

Answer any two full questions, each carries 15 marks.

Marks

1 a) Define stability factor for β variation. Derive the expression for stability factor for leakage current of voltage divider biasing circuit. (7)

b) Using hybrid π model, obtain the expression for input impedance, output impedance and mid band voltage gain of a common collector amplifier. (8)

2 a) Derive the condition that must be satisfied by a RC circuit to behave as a differentiator. Design a differentiator circuit to differentiator a square wave of 2KHz frequency. (5)

b) Sketch the response of a RC low pas circuit to a pulse input if RC>> t_p and RC<< t_p. (3)

c) Draw a two stage CE cascade amplifier. Derive an expression for its input resistance, output resistance and voltage gain. (7)

3 a) Draw the circuit of CE voltage amplifier with potential divider bias .Mention use of each component in it. What do you mean by half power points in its frequency response? (7)

b) Calculate the small signal voltage gain, input impedance and output impedance of common emitter amplifier having R_1=56K, R_2=15K, R_C=2K, R_E=1K, R_S=0.5K, V_{CC}=20V, V_{BE}=0.7V, V_A=∞ and β=50 (8)

PART B

Answer any two full questions, each carries 15 marks.

4 a) Draw the high frequency hybrid π equivalent model of BJT. Derive an expression for short circuit gain (5)

b) Outline Millers Theorem in a two port electrical circuit. (3)

c) Explain series - series feedback topology with neat block diagram. Derive the expression for net input and output impedance. (7)

5 a) Draw the small signal high frequency hybrid π model of a common emitter (8)

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 bridge oscillator. (7)

6 a) Derive the expression for upper cut off frequency of a common collector amplifier using high frequency hybrid π equivalent model. (8)

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 expression for period of the monostable multivibrator. (10)

b) What are the factors affecting the variation in output voltage of voltage regulator? With a circuit diagram, explain how load and line regulations are achieved in a shunt voltage regulator. (10)

8 a) Explain class B power amplifier. Show that the maximum conversion efficiency of the idealized class B push pull amplifier is 78.5% (7)

b) Determine W/L ratio of a MOSFET amplifier which is biased in such a way that V_{GSQ}=2V, Vt= 1V and μC_{ox} = 0.3 mA/V^2 for a drain current 2mA. (8)

c) Determine g_m for enhancement type MOSFET if Vt= 3V and it is biased at V_{GSQ}=8V. Assume μC_{ox} W/L=0.2x10^{-3}mA/V^2 (5)

9 a) With neat diagram explain bootstrap sweep circuit. Derive an expression for its retrace period. (8)

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 amplifier using small signal model in mid frequency. (8)

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

THIRD SEMESTER B.TECH DEGREE EXAMINATION(R&S), DECEMBER 2019

Course Code: EC205

Course Name: ELECTRONIC CIRCUITS

Max. Marks: 100 Duration: 3 Hours

PART A

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

1 a) Draw an RC differentiator circuit. Give the conditions for an RC circuit to behave as a differentiator. (4)

b) Design an integrator for an input frequency of 1kHz. (3)

c) A high pass RC circuit has a 3dB cut off frequency of 10Hz. Plot the output waveform of the circuit, if a 20Hz symmetric square wave with 2V peak to peak is applied to it. Mark the time and voltage levels accurately. (8)

2 a) Define stability factor for leakage current. Derive an equation for stability factor of emitter bias circuit. (4)

b) For a fixed bias circuit with R_B=300kΩ, R_C=2kΩ, β=50, V_{CC}=9V, find the Q point and stability factor. (4)

c) A silicon transistor with β=50 is used in a voltage divider bias circuit with V_{BE}=0.6V, V_{CC}=22.5V and R_C=5.6K. It is desired to establish Q point at (8.2V, 2.3mA) and required stability factor is $S \leq 3$. Design the voltage divider circuit. (7)

3 a) Draw a common base amplifier circuitand show its small signal hybrid π model. (4)

b) Prove that the mid band gain of an emitter follower circuit is approximately equal to unity. (5)

b) For a RC coupled amplifier with bypass capacitor, the circuit components are R_1=35.2 kΩ, R_2=5.83 kΩ, R_C=10kΩ, R_E=1K and R_S=0.The transistor parameters are $V_{BE(ON)}$=0.7V, V_A=100V, and β=100. Determine the Q-point and small signal voltage gain [V_{CC}=5V]. (6)

PART B

Answer any two full questions, each carries 15 marks.

4 a) Explain the terms beta cut off frequency (f_β) and unity gain bandwidth (f_T) in relation with short circuit gain of a transistor. Derive an expression for f_β and f_T in terms of transistor parameters. (6)

b) Determine the upper cut-off frequency of a common emitter amplifier (9)

configuration using hybrid π equivalent circuit.

5 a) What is a cascode amplifier? Draw the circuit diagram and derive an expression for mid band voltage gain of cascode amplifier. (9)

b) An amplifier without feedback has a voltage gain of 50, input impedance 1kΩ and output impedance 2.5kΩ. Obtain the input and output impedances of current-shunt negative feedback amplifier using the above amplifier with a feedback factor of 0.2. (6)

6 a) Draw the circuit diagram of a Wien bridge oscillator. Explain how Barkhausen criterion for oscillation is satisfied by the circuit and derive an expression for the frequency of oscillation. (8)

b) Differentiate between synchronous and stagger tuned amplifiers. (3)

c) Draw the circuit diagram of a Colpitts oscillator (4)

PART C

Answer any two full questions, each carries20 marks.

7 a) Classify power amplifiers based on collector current waveforms and conduction angle. (5)

b) Draw the circuit diagram of class A series fed power amplifier and prove that the conversion efficiency is 50% by using transformer coupling. (10)

c) What is cross over distortion in class B power amplifier? How is it avoided? (5)

8 a) Draw the circuit diagram of bootstrap sweep circuit. (4)

b) Explain the working of an astable multivibrator with necessary base and collector waveforms. (9)

c) Derive an expression for the free running frequency of astable multivibrator. (7)

9 a) With a neat circuit diagram explain the working of a transistor based shunt voltage regulator. (9)

b) How is short circuit protection provided in series voltage regulator. (7)

c) Analyze a common source amplifier with source resistance bypassed and derive expressions for input impedance, output impedance and voltage gain using small signal equivalent circuit.. (4)

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Third semester B.Tech examinations (S) September 2020

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

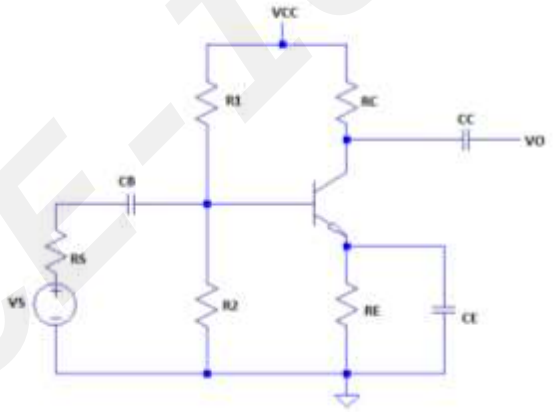
1 a) Derive an expression for current stability factor of collector to base bias. (6)

b) Plot the response of high pass RC circuit to symmetrical square wave input of 2V peak to peak, 20Hz. Given the cut off frequency of filter is 10Hz. (5)

c) Derive 3-dB frequency of a high pass RC circuit. (4)

2 a) Show how an RC circuit can behave as an integrator. (5)

b) Obtain the input resistance, output resistance and voltage gain of the given circuit using hybrid pi model. [Given Vcc=15V, R_S =1K, R_1=22K, R_2=15K, R_C=8K, R_E=2K, CE=CC=CB=0.01μF, β=100 and V_{BE}=0.7V]. (10)



3 a) Draw the circuit of a Common collector amplifier and derive the expressions for voltage gain and input impedance. (8)

b) What is the need for biasing and illustrate how Q point is fixed on a DC load line. (3)

c) Determine the stability factor of a fixed bias CE-BJT amplifier with V_{CC}= 12V, R_C=10K, R_B=5k and β=120 (4)

PART B

Answer any two full questions, each carries 15 marks.

4 a) Explain the working of Wien bridge oscillator. Derive the expression for its frequency of oscillation. (10)

b) Given the transistor parameters as f_T = 600MHz at Ic = 1mA, Cμ = 0.5pF, β_0 = 100.Calculate the bandwidth f_β and capacitance C_Π of transistor. (5)

5 a) Discuss *any two* feedback topology. (6)

b) Derive the expression for upper cut frequency of a common emitter amplifier with voltage divider bias. (9)

6 a) Compare stagger tuned and synchronous tuned amplifiers. (5)

b) Draw the circuit of Cascode amplifier. Derive the expressions for midband gain and pole frequencies. (10)

PART C

Answer any two full questions, each carries 20 marks.

7 a) What do you mean by conversion efficiency of a power amplifier? (3)

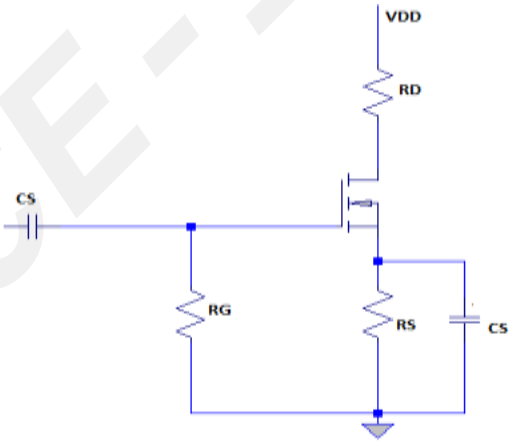
b) Draw the circuit diagram of a class C power amplifier and explain its working with output waveforms. How a distortionless output is obtained in the collector of a Class C power amplifier. (8)

c) Explain the working of bootstrap sweep circuit with the help of neat circuit diagram and waveforms. (9)

8 a) Explain any two biasing techniques for enhancement MOSFET. (8)

b) Analyze the following circuit and determine a) operating points b) voltage gain. (12)

Given that V_{DD}=12V,C_S=10μF, R_D=2.2K, R_G=5MΩ, R_S=4K, I_{DSS}=9mA,V_p= - 5V.



9 a) Draw the circuit of astable multivibrator and explain its working with the help of collector and base waveforms. Derive the expression for its frequency of oscillation. (10)

b) Explain the working of feedback series voltage regulator. How do you provide short circuit protection in it? (10)

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