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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