Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

THIRD SEMESTER B.TECH DEGREE EXAMINATION, APRIL 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) Draw the circuit of a CB amplifier and derive expressions for voltage gain and input resistance. (7)

b) An NPN BJT amplifier has been biased using potential divider. The Q points are I_C = 1 mA and V_{CE} = 5V. Given V_{CC} = 20V, V_{RE} = 3V, β = 100 and V_{BE} = 0.6V. For a stability factor of 5, design the bias circuit. (8)

2 a) For a common emitter (emitter bypassed) amplifier, V_{CC} =9V, R_E=1.2KΩ, R_1=27KΩ, R_2=15K Ω, R_S=10K Ω, R_L=2KΩ, R_C=2.2KΩ. For the transistor β =100, V_{BE}=0.7V and V_A=100V. Determine input resistance, output resistance, voltage gain and current gain. Also determine the voltage gain by taking source resistance into consideration. (10)

b) Draw the approximate small signal model of a transistor in VCCS and CCCS modes. Give the significance of each component. (5)

3 a) Under what condition, a high pass RC circuit can be used as a differentiator? (4)

b) For a low pass circuit, input is a square wave of 4 V peak to peak, the duration of positive section is 0.2 sec and that of negative section is 0.1 second. Plot the output waveform to scale. Given the time constant of the circuit as 0.2 second. (8)

c) Explain how amplifiers are classified based on the method of coupling used. (3)

PART B

Answer any two full questions, each carries 15 marks

4 a) Draw the circuit of a Wien bridge oscillator and explain. Derive the expression for its frequency of oscillation. (9)

b) Compare RC and LC oscillators. (3)

c) Compare stagger tuning and synchronous tuning. (3)

5 a) An amplifier with open loop gain of 1000 delivers 10 W of output power at 10% of second harmonic distortion when the input is 10 mV. If 40 dB negative feedback is applied and the output power to remain the same, determine (i) required input voltage (ii) percentage second harmonic distortion. (8)

b) Explain briefly the various broad-banding techniques in an amplifier. (7)

6 a) Draw the circuit of a cascode amplifier. Derive the expression for mid-band gain and pole frequencies. (11)

b) A BJT is biased at I_C = 0.25 mA. The parameters are β_0 = 100 and and C_μ= 0.1 pF. The β cut-off frequency is 11.5 MHz. Determine C_π (4)

PART C

Answer any two full questions, each carries 20 marks

7 a) Draw the circuit of a common source amplifier using MOSFET. Derive the expressions for voltage gain and input resistance. (8)

b) Design a Zener regulator for the following specifications: unregulated input 15-30V, output voltage = 10V, load current 0-100mA. Assume that the Zener stabilizes at a minimum current of 10mA. (8)

c) Compare series and shunt regulators. (4)

8 a) Draw the circuit of a class B push-pull amplifier and explain its operation. What is its drawback? How it can be overcome? (9)

b) Explain the working of Schmitt trigger circuit with relevant waveforms. Obtain expressions for UTP and LTP. (11)

9 a) Design an astable multivibrator for a period of oscillation of 5 kHz. Use a transistor with $\beta = 100$, $V_{BE(sat)} = 0.7V$, $I_C = 3$ mA and $V_{CE(sat)} = 0.2V$. (6)

b) Draw the circuit of a series voltage regulator and explain its operation clearly. Discuss how short circuit protection can be provided in the circuit. (9)

c) Explain how a transistor can be used as a switch? (5)

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