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**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**

THIRD SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2017

**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) What is the condition for an RC circuit to behave as an integrator? (4)

b) Design a differentiator circuit to differentiate a square wave of 20V peak to peak amplitude and 1.5KHz frequency. (4)

c) Prove that for an emitter follower circuit gain is approximately one. (7)

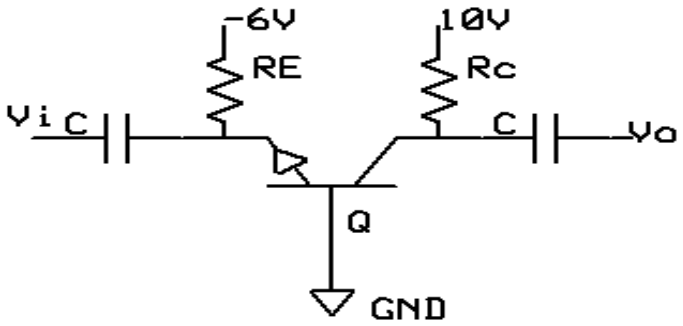
2 a) For a voltage divider network, $R_1$=36K, $R_2$ = 9K, $R_E$ =2K, $R_C$ =9K, $V_{CC}$= 24V, $V_{BE}$=0.7V. Calculate $I_C$ and $V_{CE}$ for β=100. (5)

b) Derive Input impedance and Voltage gain of a Common Emitter Amplifier with emitter bypassed for the mid frequency range using hybrid π model. (6)

c) For a fixed bias circuit, $V_{CC}$=10V, $R_B$ = 50K, $R_C$ = 500Ω. Assume silicon transistor with β=50 and $V_{BE}$ = 0.7V. Find the co-ordinates of Q point. (4)

3 a) A square wave of peak to peak amplitude 4V extending ±2V with respect to ground is applied to a low pass RC circuit. The duration of positive section is 0.2sec and that of negative section is 0.1sec. Plot the output waveform. The time constant of the circuit is 0.2sec. (7)

b) For the circuit shown, calculate input impedance, output impedance and voltage gain for the mid frequency range using hybrid π model. $R_E$=6.8K, $R_C$=4.7K, α =0.99 (8)




**PART B**

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

4 a) Draw the circuit diagram of a RC phase shift oscillator and explain its working. Derive the expression for frequency of oscillation. (10)

b) Derive expression for short circuit current gain in terms of frequency of operation. (5)

5 a) Calculate the bandwidth $f_\beta$ and capacitance Cπ of a BJT whose $f_T$ = 500MHz at $I_C$ = 1mA, β = 100 and Cμ = 0.3pF (6)

b) Explain how negative feedback acts on gain, distortion, stability and frequency response of a circuit. (9)

6 a) Explain Miller's theorem. (4)

b) Discuss the variation of input and output resistance on voltage series and current shunt feedback. (6)

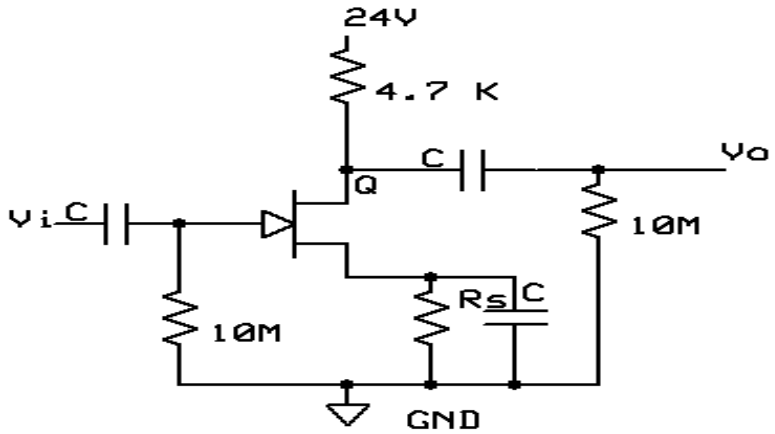
c) Draw the circuit of a cascode amplifier and briefly explain its features. (5)

## PART C

***Answer any two full questions, each carries 20 marks.***

7 a) Explain the working of an astable multivibrator circuit with a neat circuit diagram and waveforms. Derive an expression for period of oscillation. (10)

b) For the circuit shown, $I_{DSS}$= 5mA, gmo = 2500μS. If Rs = 820Ω, what is $I_D$, $V_{GS}$ and $V_{DS}$. (10)




8 a) For a series fed class A amplifier, $R_B$ =1K, $R_C$ =20Ω and $V_{CC}$ = 20V. β for BJT is 25. Calculate the input power, output power and conversion efficiency for an input voltage resulting in a base current of 10mA peak. (6)

b) Derive expressions for voltage gain and output resistance for a common source amplifier with source bypassed using small signal model in mid frequency. (8)

c) Compare Class A, Class B and Class AB power amplifiers. (6)

9 a) Explain the working of bootstrap circuit with a neat circuit diagram and waveforms. (7)

b) Prove that the conversion efficiency of Class B amplifier is 78.5%. (5)

c) With a neat circuit diagram, explain how output voltage can be regulated by using series feedback voltage regulator. How short circuit protection can be implemented in this? (8)

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