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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Third semester B.Tech examinations (S) September 2020

Course Code: EE203 Course Name: ANALOG ELECTRONICS CIRCUITS

Max. Marks: 100

Duration: 3 Hours

PART A

Answer all questions, each carries 5 marks.Marks1Sketch the circuit of a biased positive clamper with a biasing voltage of +2V for
a ±10V square wave input. Also plot its output voltage waveform and explain
its operation.(5)2State and explain Miller's theorem.(5)

- 3 An amplifier having an input resistance $4k\Omega$ has a voltage gain of 200. If a (5) series negative feedback with β =0.01 is introduced, determine the value of input resistance of the feedback amplifier. If the amplifier in its open loop configuration had cut off frequencies f_1 = 2kHz and f_2 = 500kHz before the feedback path was added, what is the new bandwidth of the circuit?
- 4 Why op-amp is not used in open loop for most of the applications? (5)
- 5 Deduce the expression for closed loop voltage gain of non-inverting amplifier. (5)
- 6 Explain the operation of an op-amp comparator with circuit diagram and (5) waveforms
- 7 Explain the operation of op-amp based crystal oscillator. Mention its advantage. (5)
- 8 Design a Wien Bridge oscillator circuit using op-amp having an oscillating (5) frequency of 10kHz.

PART B

Answer any two full questions, each carries 10 marks.

- 9 a) Explain the operation of a two level clipper circuit. (5)
 b) Determine the minimum and maximum possible values of series resistance Rs (5) of a zener voltage regulator circuit feeding a 1kΩ load from a supply voltage of 20V. Maximum value of zener current is 40mA and zener voltage is 10V.
- 10 a) With the help of a neat diagram, explain the small signal model of FET. (4)

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b))	Derive the ex	xpression	for output	impedance	and v	oltage	gain of	a Comm	on	(6)
		Source JFET Amplifier.									
		Drow the sin	and of a		tantial divid	on hios	anti		Damirua	.l	(5)

- 11 a) Draw the circuit of a BJT in potential divider bias configuration. Derive the (5) expression for Q point voltage and current.
 - b) Explain the high frequency hybrid pi model of a common emitter transistor. (5)

PART C

Answer any two full questions, each carries 10 marks.

- 12 a) Explain the concept of virtual short in op-amps. (5)
 - b) Draw the circuit diagram of Colpitt's Oscillator and explain its principle of (5) operation.
- 13 a) What is the concept of negative feedback and draw the schematic diagrams of (5) four basic negative feedback configurations.
 - b) What is class A operation and derive the expression for conversion efficiency of (5) a transformer coupled class A power amplifier.
- 14 a) Draw the circuit diagram of a two stage direct coupled transistor amplifier. (5) Mention its advantages and application.
 - b) Derive the expression for frequency of oscillation of a wien bridge oscillator (5) using BJT.

PART D

Answer any two full questions, each carries 10 marks.

- 15 a) Analyse the operation of a precision rectifier using op-amp using circuit (5) diagram and waveforms.
 - b) Design an adder circuit using an op-amp to get the output expressions as (5) V_{out} = -(V₁+5V₂+25V₃), where V₁, V₂ and V₃ are the inputs. Given that R_f=50 k Ω .
- 16 With the help of a neat diagram explain the operation of monostable (10) multivibrator using 555 IC.
- 17 a) Draw the circuit diagram and explain the working of a ramp generator using (5) opamp.

b) Explain the effect of slew rate of opamp on waveform generation.

(5)