## **Question Paper**

Exam Date & Time: 08-Mar-2021 (09:00 AM - 12:00 PM)



## THIRD SEMESTER B.TECH (ELECTRONICS AND INSTRUMENTATION) END SEMESTER EXAMINATIONS, MARCH 2021 DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

## ANALOG ELECTRONIC CIRCUITS [ICE 2151]

Marks: 50

A)

Duration: 180 mins.

Α

## Answer all the questions.

Missing data may be suitably assumed.

- Explain (a) channel length modulation (b) different region of operations of MOSFET with suitable (5) diagrams. Derive an expression for I<sub>Dmax</sub>.
  - B) With the help of equivalent circuits, derive the expression for input and output impedance of a (3) degenerated common source amplifier.
  - C) Calculate the small signal voltage gain of the network shown below for W/L = 10/0.18,  $\lambda$  = 0.1V<sup>-1</sup>, (2) µn Cox = 200µA / V<sup>2</sup>and V<sub>DD</sub> = 1.8V



2)

Explain the concept of cascode current source in FET amplifier. Due to a manufacturing error, a (5) CMOS cascode amplifier has been configured as shown below. Calculate voltage gain of the circuit

A)



B)	Explain the concept of Common Mode Rejection Ratio (CMRR) in MOS Differential pairs.	(3)
C)	With the help of small signal analysis, derive the expression for voltage gain of a source follower.	(2)
	Compute the gain for the circuit shown below	(5)

A)

3)



	B)	Explain the concept of 'Miller Effect' by taking a simple source follower circuit as an example.	(3)
	C)	Determine voltage gain, input and output impedance with feedback for, voltage-series feedback circuit having A = -100, Ri = $10k\Omega$ and R <sub>0</sub> = $20k\Omega$ .and $\beta$ = -0.5.	(2)
4)		Mention any four use of negative feedback amplifier? Illustrate input and output impedance expression for voltage series feedback connection.	(5)
	A)		
	B)	With a neat diagram, explain the working principle of FET Hartley oscillator.	(3)
	C)	Calculate the oscillating frequency of a FET Colpitts oscillator with C1 = 750pF, C2 = 2500pF L = 40 $\mu\text{H}.$	(2)
5)		Compare class A, class B and class C power amplifiers with two important parameters. With the suitable diagram, explain how we can increase class A amplifier efficiency up to 50%.	(5)
	A)		
	B)	Prove that a class B amplifier achieves a maximum efficiency of 78.5%.	(3)
	C)	What is Crossover distortion in class B power amplifier? Explain with necessary sketches.	(2)

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