

University of Mumbai
Examination May-June 2022

Program: **Electronics Engineering**

Curriculum Scheme: Rev2016

Examination: BE Semester VIII

Course Code: ELX802 and Course Name: AnalogandMixedVLSIDesign

Time: 2 hours 30Minutes

Max. Marks: 80

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks	20
		Marks
1.	In current mirror circuit, the first MOSFET (which copy current from reference) is operating in which region?	
Option A:	Linear	
Option B:	Saturation	
Option C:	Cut-off	
Option D:	deep triode region	
2.	Which of the following statement is true in case of Base to Emitter voltage (V_{BE}) of BJT?	
Option A:	It has negative temperature coefficient	
Option B:	It has positive temperature coefficient	
Option C:	It has both temperature coefficient	
Option D:	It is equal to $(I_B)^2$	
3.	The condition for MOSFET to be in deep triode region is-----.	
Option A:	$V_{DS} \ll 2(V_{GS} - V_{TH})$	
Option B:	$V_{DS} \gg 2(V_{GS} - V_{TH})$	
Option C:	$V_{DS} \ll (V_{GS} - V_{TH})$	
Option D:	$V_{DS} \gg (V_{GS} - V_{TH})$	
4.	Thermal noise is generated from MOSFET by -----	
Option A:	Conduction of charge carriers in the channel	
Option B:	Electric field across the gate and channel	
Option C:	Capacitance of the gate oxide	
Option D:	Substrate bias effect	
5.	CS amplifier with Source degeneration voltage gain	
Option A:	increases	
Option B:	decreases	
Option C:	moderate	
Option D:	zero	

6.	r_{ro} is the internal resistance of a MOSFET is equal to
Option A:	$1/\lambda I_D$
Option B:	λI_D
Option C:	I_D/λ
Option D:	λI_D
7.	In Switched Capacitor circuits, to achieve a higher sampling speed, _____ & _____ must be used.
Option A:	A small aspect ratio, a small capacitor
Option B:	A Large aspect ratio, a large capacitor
Option C:	A small aspect ratio, a large capacitor
Option D:	A Large aspect ratio, a small capacitor
8.	Which of the following is the main advantage of semicustom design approach over full custom design?
Option A:	Use of standard cells to reduce design time and complexity
Option B:	High performance
Option C:	More complexity
Option D:	High Speed
9.	What is the function of low pass filter in phase-locked loop (PLL) circuit?
Option A:	Improves low frequency noise
Option B:	Removes high frequency noise
Option C:	Tracks the voltage changes
Option D:	Changes the input frequency
10.	The resolution of 8-bit DAC/ADC is _____
Option A:	562
Option B:	256
Option C:	625
Option D:	128

Q2	Solve any Four out of Six	5 marks each
A	Explain trade-offs in analog design with the help of analog design octagon.	
B	What are the disadvantages of basic current mirror circuit and how it is overcome in cascode current mirror?	
C	Explain the concept of switched capacitor circuit.	
D	Which errors are contributed by charge injection mechanism in MOS sampling circuits?	
E	Compare performance parameters of various op-amp topologies.	
F	Explain behaviour of g_m as function of below parameters 1. Overdrive voltage with W/L constant. 2. Overdrive voltage with I_D constant	

Q3	Solve any two out of three	10 marks each
A	Derive the expression of voltage gain and output resistance of the source follower circuit.	
B	What is a bandgap reference? Describe methods of implementation of band gap references.	
C	Explain AMS design flow in VLSI circuit. Compare full custom and semi-custom design.	

Q4	Solve any two out of three	10 marks each
A	Draw and explain charge pump PLL circuit	
B	What are the various types of ADC architectures? Explain any two architectures in detail.	
C	Derive the equation of Differential gain and Common mode gain of differential amplifier.	