Printed Page 1 of 1 **Sub Code:EEC501**

Paper Id: **130511** **Roll No:** | | | | | | | | | | | | | |

B. TECH.
(SEM-V) THEORY EXAMINATION 2019-20
INTEGRATED CIRCUITS

Time: 3 Hours ***Total Marks: 100***

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. **2 x 10 = 20**

(i) What do you mean by Current Mirror circuit?
(ii) Give small signal model of transistor.
(iii) What do you mean by DC analysis of a circuit?
(iv) For Widlar current source assume $I_{ref} = 1mA$ and $R_2 = 5\ K\Omega$, neglect base current, find I_{C2}.
(v) Give two application of analog multiplier.
(vi) Define a Filter circuit.
(vii) Differentiate between Comparator and Schmitt trigger.
(viii) Describe the need of voltage limiter circuits.
(ix) The basic step of an 8-bit DAC is 20mV. If 00000000 represents 0V, what is represented by the input 10110111.
(x) Which is the fastest ADC and why.

SECTION B

2. Attempt any *three* of the following: **10x3=30**

(a) Describe the operation and characteristics of a BJT complementary push-pull output stage.
(b) Draw the circuit of state variable filter and find the transfer function of Low pass, High pass and Band pass filters.
(c) Describe temperature compensated Log amplifier using two op-amp & explain its operation.
(d) What do you mean by the quadrant operation of multiplier. Draw and explain a GILBERT analog multiplier.
(e) Draw the block diagram of a PLL and explain its operation. Explain lock-in-range, capture range and pull-in time of a PLL. List the application of PLL.

SECTION C

3. Attempt any *one* part of the following: **10x1=10**

a) Explain the circuit of Wilson MOS current mirror. Also discuss how it can be improved.
b) The parameter of the three transistor CM are $V_{CC} = 9V$, $V_{EE} = 0$, $R_1 = 12K\Omega$, $VBE_{(on)} = 0.7V$, $\beta = 75$, $V_A = \infty$. Calculate the value of current, I_{ref}, I_o, IC1, I_{B1}, I_{B2}, IB3, IE3.

4 Attempt any *one* part of the following: **10x1=10**

a) Draw the V-I converter and derive its output equation for grounded load.
b) Derive the output expression for RC Phase Shift Oscillator.

5 Attempt any *one* part of the following: **10x1=10**

a) Give CMOS implementation of a SR flip-flop and explain its working.
b) Discuss the features of CMOS circuit. Realize one AND-OR-INVERT (AOI) and one OR-AND-INVERT (OAI) function using CMOS logic circuit.

6 Attempt any *one* part of the following: **10x1=10**

a) Draw & explain the working of monostable multivibrator using op-amp.
b) Describe the working of single op-amp based full wave precision rectifier.

7 Attempt any *one* part of the following: **10x1=10**

a) Draw and Explain the block diagram of IC 555.
b) Explain the operation of dual slope ADC giving its neat diagram.