

Subject Code: XXXXX

Roll No:

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**BTECH
(SEM-5) INTEGRATED CIRCUITS 2021-22**

TIME:3 HOUR

Total Marks: 100

Instruction: Attempt the questions as per the given instructions. Assume missing data suitably.

SECTION - A

Attempt *All Parts* in Brief

2*10 = 20

Q1	Questions	Marks
(a)	What is meant by the term matched transistors.	2
(b)	What is a Current Mirror circuit ? Give its need.	2
(c)	Define and give significance of Slew Rate.	2
(d)	What do you mean by the quadrant operation of multiplier?	2
(e)	What do you mean by a frequency response of a filter circuit?	2
(f)	Differentiate wide band and narrow band pass filter.	2
(g)	What role does PDN play in CMOS implementation?	2
(h)	Differentiate between a peak detector and sample and hold circuit.	2
(i)	Describe the need of voltage limiter circuits.	2
(j)	List the application of PLL.	2

SECTION - B

Attempt Any Three of the following

3*10 = 30

Q2	Questions	Marks
(a)	Find out the overall gain of an op-amp IC741 giving its cascaded equivalent circuit derived for its three stages. Also drive the relationship between f_T and Slew Rate for IC741.	10
(b)	Draw the generalized impedance converter and derive its impedance equation. Also simulate an Inductor.	10
(c)	Describe temperature compensated Log amplifier using two op-amp and explain its operation.	10
(d)	Sketch the logic gate symbolic representation of clocked SR flip-flop using NAND gate. Also sketch its CMOS circuit implementation and explain its operation.	10
(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	10

SECTION - C

Attempt Any One of the following

5*10 = 50

Q3	Questions	Marks
(a)	Describe the operation and characteristics of a BJT complementary push-pull output stage.	10
(b)	Give circuit description of IC741 with the help of its block diagram.	10
Q4	Questions	Marks
(a)	Draw and explain Narrow Band Reject Filter. Also, find its transfer function.	10
(b)	Compare and contrast active filters and passive filters. Design band pass filter with single op-amp for the given specifications : $f_L = 1 \text{ KHz}$; $f_H = 1.2 \text{ KHz}$, $A_F = - 5$.	10
Q5	Questions	Marks
(a)	Draw the circuit diagram for monostable multivibrator with operational amplifier. Explain its operation. Derive the expression for its time period.	10
(b)	What do you mean by the quadrant operation of multiplier? Draw and explain a GILBERT analog multiplier.	10
Q6	Questions	Marks
(a)	Explain the structure and operation of CMOS inverter. Realize the circuit of 2 input NOR gate and 2 input NAND gate using CMOS and explain the operation.	10
(b)	Discuss the features of CMOS circuit. Describe D-F/F circuit using NAND CMOS gates.	10

Q7	Questions	Marks
(a)	Explain the block diagram of IC 555. Design a 555 timer as astable multivibrator with an output signal with frequency 2 KHz and 75 % duty cycle.	10
(b)	Describe the working of an VCO with the help of functional block diagram of VCO IC 566.	10