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B.TECH.
(SEM V) THEORY EXAMINATION 2021-22
INTEGRATED CIRCUITS

Time: 3 Hours

Total Marks: 100

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief.

2 x 10 = 20

- What is meant by the term matched transistors.
- What is a Current Mirror circuit. Give its need.
- Define and give significance of Slew Rate.
- What do you mean by the quadrant operation of multiplier.
- What do you mean by a frequency response of a filter circuit.
- Differentiate wide band and narrow band pass filter.
- What role does PDN play in CMOS implementation.
- Differentiate between a peak detector and sample and hold circuit.
- Describe the need of voltage limiter circuits.
- List the application of PLL.

SECTION B

2. Attempt any *three* of the following:

10x3=30

- 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.
- Draw the generalized impedance converter and derive its impedance equation. Also simulate an Inductor.
- Describe temperature compensated Log amplifier using two op-amp & explain its operation.
- Sketch the logic gate symbolic representation of clocked SR flip-flop using NAND gate. Also sketch its CMOS circuit implementation and explain its operation.
- Draw the block diagram of a PLL and explain its operation. Explain lock-in-range, capture range and pull-in time of a PLL.

SECTION C

3. Attempt any *one* part of the following:

10x1=10

- Describe the operation and characteristics of a BJT complementary push-pull output stage.
- Give circuit description of IC741 with the help of its block diagram.



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4. Attempt any *one* part of the following:

10x1=10

- Draw and explain Narrow Band Band Reject Filter. Also, find its transfer function.
- Compare and contrast active filters and passive filters. Design band pass filter with single op-amp for the given specifications: $f_L = 1\text{KHz}$; $f_H = 1.2\text{ KHz}$, $A_F = -5$.

5. Attempt any *one* part of the following:

10x1=10

- Draw the circuit diagram for monostable multivibrator with operational amplifier. Explain its operation. Derive the expression for its time period.
- What do you mean by the quadrant operation of multiplier. Draw and explain a GILBERT analog multiplier.

6. Attempt any *one* part of the following:

10x1=10

- 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.
- Discuss the features of CMOS circuit. Describe D-F/F circuit using NAND CMOS gates.

7. Attempt any *one* part of the following:

10x1=10

- Explain the block diagram of IC 555. Design a 555 timer as astable multivibrator with an output signal with frequency 2KHz and 75% duty cycle.
- Describe the working of an VCO with the help of functional block diagram of VCO IC566.

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