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PRESIDENCY UNIVERSITY BENGALURU

**SET-B**

SCHOOL OF ENGINEERING

**END TERM EXAMINATION – MAY/JUNE 2024**

**Semester :** Semester II - 2023

**Course Code :** ECE2001\_v02

**Course Name :**  - Analog Electronics

**Program :** B. Tech.

**Date :** JUNE 20, 2024

**Time :** 1:00 PM - 4:00 PM

**Max Marks :** 100

**Weightage :** 50%

**Instructions:**

1. *Read all questions carefully and answer accordingly.*
2. *Question paper consists of 3 parts.*
3. *Scientific and non-programmable calculator are permitted.*
4. *Do not write any information on the question paper other than Roll Number.*

**PART A**

**ANSWER ANY THREE QUESTIONS (3 Q X 5 M = 15 M)**

* 1. A filter circuit lets the DC component go to the load while removing the AC component from the rectified output.

Illustrate the operation of a half-wave rectifier with a capacitor filter with the help of a circuit diagram and relevant waveforms.

(CO5,CO1) [Knowledge]

* 1. In signal generator circuits, Emitter follower configuration provides high input impedance and low output impedance.

With a neat diagram explain the working of the emitter follower configuration.

(CO2,CO5) [Knowledge]

* 1. The field-effect transistor is a type of transistor that uses an electric field to control the flow of current in a semiconductor.

Give 5 distinguishing points to compare JFET and MOSFET.

(CO3,CO5) [Knowledge]

* 1. The insulating layer of SiO2 in the MOSFET construction accounts for the very desirable high input impedance of the device. Draw the symbols of n-channel and p-channel MOSFET indicating their terminals. Show the construction of the n-channel D-MOSFET and write its current equation.

(CO3,CO5) [Knowledge]

* 1. A power amplifier (PA) converts a low-power signal to a higher power one. Give the Comparison of Different Classes of Power Amplifiers.

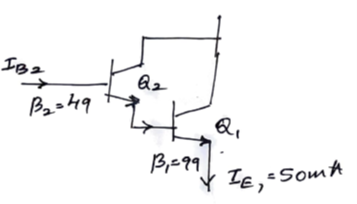
(CO5,CO4) [Knowledge]

**PART B**

**ANSWER ANY TWO QUESTIONS (2 Q X 20 M = 40 M)**

* 1. Amplifiers strengthen or boost the weak signal without changing any input or information. With a neat circuit diagram explain the working of a Darlington amplifier.

The transistor Q1 has a gain of β1=99, and transistor Q2 has a gain of β2=49. Find the current IB2 in the circuit.



(CO2,CO5) [Comprehension]

* 1. E-MOSFET has no conducting channel between two terminals, the source terminal and the gate terminal.

With a neat diagram explain the working principle of the enhancement type MOSFET.

For a certain D-MOSFET in a circuit, *I*DSS was found to be 10 mA at *V*GS(off) equals -8 V.

* + 1. Is this an *n*-channel or a *p*-channel?
    2. Calculate *I*D at *V*GS = -3 V.
    3. Calculate *I*D at *V*GS= +3 V.

(CO5,CO3) [Comprehension]

* 1. A transistor amplifier with proper positive feedback can act as an oscillator. Illustrate the concept of Feedback for an oscillator. Also, explain the working of Colpitts Oscillator with a neat diagram.

For an Oscillator circuit, choose the capacitor values for a Colpitts oscillator so that f = 1 MHz, β = 0.25 and a 1 mH inductor is available in the circuit.

(CO4,CO5) [Comprehension]

**PART C**

**ANSWER ANY THREE QUESTIONS (3 Q X 15 M = 45 M)**

* 1. In electronics, a circuit that is designed to prevent a signal from exceeding a predetermined reference voltage level. Explain the working of 5 different types of clipper circuits with appropriate input-output waveforms.

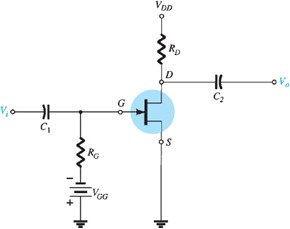
(CO1,CO5) [Application]

* 1. A multistage amplifier is an electronic amplifier that consisting of two or more single-stage amplifiers connected. List the types of Multistage amplifiers. Explain the RC-coupled transistor amplifier with a neat circuit diagram. Explain the frequency response of the amplifier.

(CO2,CO5) [Application]

* 1. In electronics, 'biasing' refers to a fixed DC voltage or current applied to a terminal of an electronic component to establish proper operating conditions for the components.

Illustrate the DC analysis for the circuit shown below.



(CO3,CO5) [Application]

* 1. Oscillators are positive feedback amplifiers. Phase-shift oscillators are often used at audio frequency as audio oscillators. Explain the working of the RC Phase shift Oscillator with a neat circuit diagram. Illustrate in detail why 3 stages of RC are used in the circuit.

A phase shift oscillator circuit uses 5pF capacitors. Find the value of R to produce a frequency of 800kHz.

(CO4,CO5) [Application]