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**PRESIDENCY UNIVERSITY
BENGALURU**

SCHOOL OF ENGINEERING

MAKE UP EXAMINATION – JAN 2023

Course Code: ECE 2001

Course Name: Analog Electronics

Program & Sem: B. Tech (ECE)

Date: 23-JAN-2023

Time: 9.30 to 12.30 PM

Max Marks: 60

Weightage: 30 %

Instructions:

(i) Read the all questions carefully and answer accordingly.

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries TWO mark.

(10Qx 2M= 20M)

1. BJTs can be connected in different configuration, Name any two configurations for a BJT.
(C.O.No.2) [Knowledge]
2. For a MOSFET define the term threshold voltage
(C.O.No.3) [Knowledge]
3. BJTs are bipolar junction transistors used in switching and amplification. In a BJT the _____ circuit is reverse biased _____ circuit is forward biased
(C.O.No.2) [Knowledge]
4. Pure semiconductors are also called as _____ semiconductors. Doped semiconductors are also called as _____ semiconductors.
(C.O.No.1) [Knowledge]
5. Stabilization is done to keep the Q point stable. Stability of a circuit is depended on the value of S. If the value of S is larger the circuit stability is _____ (High/ Low) (C.O.No.2) [Comprehension]
6. The circuit which shifts the DC level of any signal is called as _____ circuit.
(C.O.No.2) [Knowledge]
7. Which is the rectifiers which has the least ripple? What is the value of the ripple?(C.O.No.2) [Knowledge]
8. For an n-channel JFET, calculate the value of resistance between the drain and the source if $I_D = 10nA$, $I_{DSS} = 100nA$, $V_{GS} = 8V$.
(C.O.No.3) [Knowledge]
9. Choose the correct option.
JFET can be damaged, if not operated with proper voltages. Which of the following could be a reason for the JFET to be damaged
 - a. $V_{GS} = 0$; $V_{DS} =$ positive
 - b. $V_{GS} < 0$; $V_{DS} =$ positive
 - c. $V_{GS} > 0$; $V_{DS} =$ positive(C.O.No. 3) [Comprehension]

10. Oscillators are circuits which generate repetitive periodic signals. An oscillator consists of an _____ circuit and a _____ circuit (C.O.No. 4) [Comprehension]

Part B [Thought Provoking Questions]

Answer all the Questions. Each question carries FIVE marks. (4Qx5M=20M)

11. For a Fixed bias circuit derive the expression for I_B , I_C and V_{CE} . Determine the value of S of the circuit. If the $R_B = 1M\Omega$, $R_C = 10K\Omega$, $\beta = 100$. Draw the circuit for the same (C.O.No.2) [Comprehension]

12. State and explain Mass action law. Differentiate between direct bandgap semiconductors and indirect bandgap semiconductors (C.O.No. 1) [Knowledge]

13. Power amplifier raises the power level of the signal. Power amplifier is also called large signal amplifiers.

- Identify the power amplifier are having largest efficiency.
- Consider and power amplifier which gives a square wave output. Can you name this power amplifier?
- Draw the circuit identified in part b of this question and explain its working (C.O.No. 4) [Comprehension]

14. With a neat Figure explain the working of the Metal Oxide Silicon Field Effect Transistor. Sketch its input and the output characteristics for the MOSFET. Differentiate between depletion and enhancement modes of operation. (C.O.No. 3) [Comprehension]

15. Feedback Amplifier is a device that is based on the principle of feedback. The process by which some part or fraction of output is combined with the input is known as feedback.

- If the feedback is added back to input signal, the amplifier is named as _____
- Draw a block diagram representation for the circuit in part a of the question and determine the expression for gain with feedback.
- Write any three differences between positive and negative feedback amplifiers (C.O.No. 4) [Comprehension]

Part C [Problem Solving Questions]

Answer all the Questions. Each question carries TEN marks. (2Qx10M=20M)

15. Consider a negative feedback amplifier having $R_i = 70K\Omega$ and the output resistance is $R_o = 1K\Omega$. Open loop gain = 100. And the feedback is 3%. The output voltage is connected in series with the input.

- Name the negative feedback amplifier and determine its gain with feedback.
- Determine the input and output resistance with feedback
- Let the distortion of the circuit with feedback be 2, What is the distortion without feedback?
- If the bandwidth of the circuit without feedback is 1MHz. What will the Bandwidth with feedback?

[10] (C.O.No.4) [Comprehension]

16. FETs is or field effect transistors and popular because of their size, power consumption and speed. For an n-channel JFET $I_{DSS} = 100mA$, $V_p = -4V$.

- For $V_{GS} = -2V$. Determine the value of I_d ,
- Find r_d if $r_o = 1K\Omega$
- Find the amplification factor
- Draw the drain and transfer characteristics

[10] (C.O.No.4) [Comprehension]