Register No.: ..... Name: .....

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

THIRD SEMESTER B.TECH DEGREE EXAMINATION (R,S), DECEMBER 2023
ELECTRICAL AND ELECTRONICS ENGINEERING
(2020 SCHEME)

Course Code : 20EET205

Course Name: Analog Electronics

Max. Marks : 100 **Duration: 3 Hours**

PART A

(Answer all questions. Each question carries 3 marks)

1. Define Operating point of BJT. List the factors affecting stability of operating point.
2. Draw the h parameter model of BJT in CE configuration. What are the advantages of hybrid parameters of transistors?
3. Compare JFET and MOSFET.
4. Define Enhancement Type MOSFET. Show the Characteristics curve of P Channel Enhancement MOSFET.
5. In a negative feedback amplifier, A= 100, β= 0.04 and V_s = 50 mV, find
   a) Gain with feedback
   b) Output voltage
6. Summarize the applications of Direct Coupled Amplifiers.
7. Distinguish between Ideal and practical Operational amplifier.
8. Illustrate the virtual short-circuit (virtual ground) concept of an op-amp.
9. Identify the drawback of zero crossing detector. Explain how it was overcome by the regenerative comparator.
10. Outline the effect of slew rate of Op-amp on waveform generation.

PART B

(Answer one full question from each module, each question carries 14 marks)

MODULE I

11. a) Derive the stability factor S for voltage divider bias with neat sketch (7)
    b) For the circuit shown in Figure1 V_{cc}=20V, R_c=2 kΩ, β=50, V_{BE}=0.7V, R_1=100 kΩ, R_2=10 kΩ and ,R_E=100 Ω. Determine I_B, V_{CE}, I_C and Stability factor S. (7)

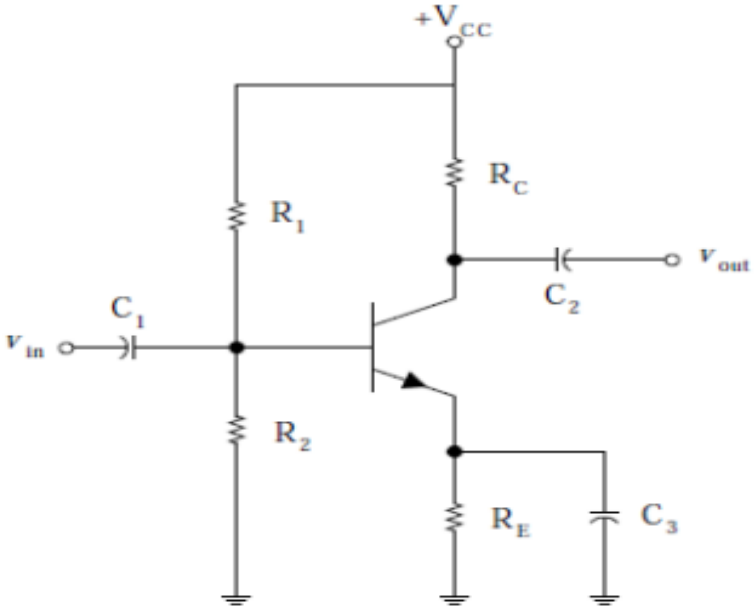
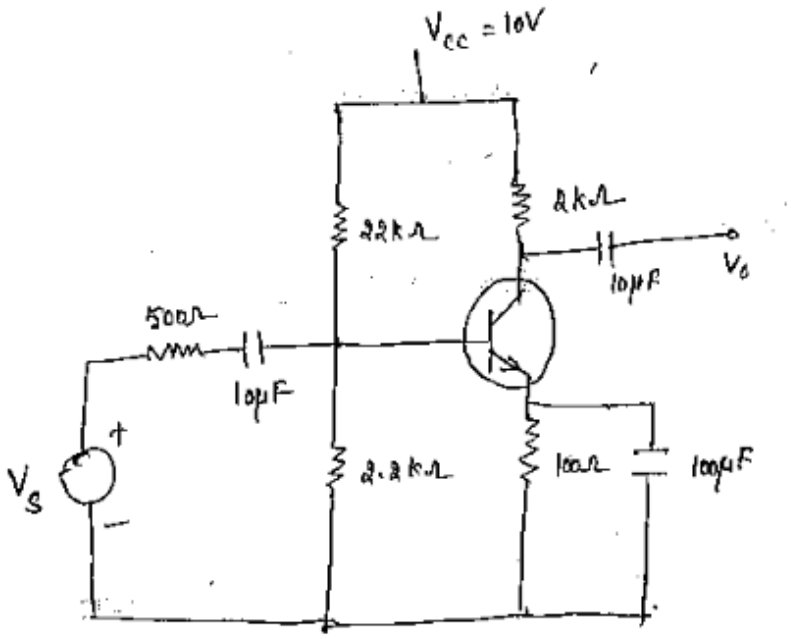


Figure 1

OR

12. a) Illustrate the small signal low frequency AC equivalent circuit of CE amplifier. (8)

b) For the CE amplifier shown in Figure. Determine the Ri, A_v and R_o. The Transistor parameters are β=100, V_{BE}=0.7 V



(6)

Figure 2

MODULE II

13. a) Explain JFET Common drain Amplifier with neat sketch (7)

b) A JFET amplifier with a voltage divider biasing circuit, shown in Figure 3 has the following parameters: V_p=-2V, I_{DSS}=4mA, R_D=910Ω, R_s=3kΩ, R_1=12MΩ, R_2 = 8.75MΩ and V_{DD} = 24V. Determine the value of the drain current I_D at the operating point. (7)

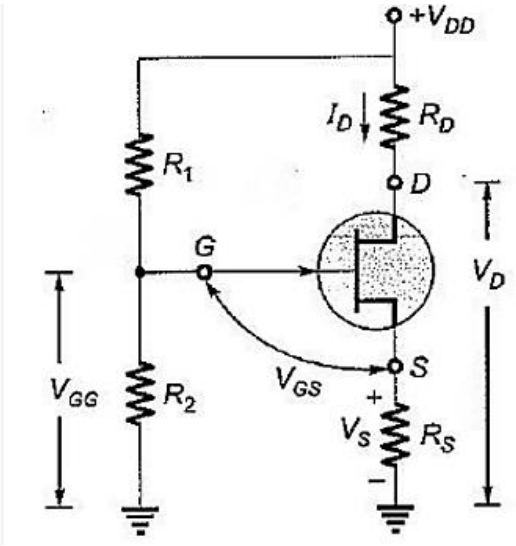


Figure 3

OR

14. a) Analyze the effect of various internal capacitances on high frequency response of BJT. (7)

b) Illustrate the Small Signal Hybrid π equivalent circuit of BJT. (7)

MODULE III

15. Explain the class B push pull power amplifier and its operation, cross over distortion with neat sketch and prove that its conversion efficiency is 78.5%. Analyze how will you eliminate cross over distortion? (14)

OR

16. a) Explain the working of Hartley oscillator. Also derive the expression for frequency of oscillation. (8)

b) In a Hartley oscillator, L_1=15mH and c=50pF. Determine L_2 for a frequency of 168kHz. The Mutual inductance between L_1 And L_2 is 5 μH. Also find the required gain of the transistor to be used for oscillations. (6)

MODULE IV

17. a) Draw and Explain the modes of operation of a fundamental differential amplifier. (7)

b) Determine the CMRR and express it in decibel for the circuit (7)

measurements shown in Figure 4.

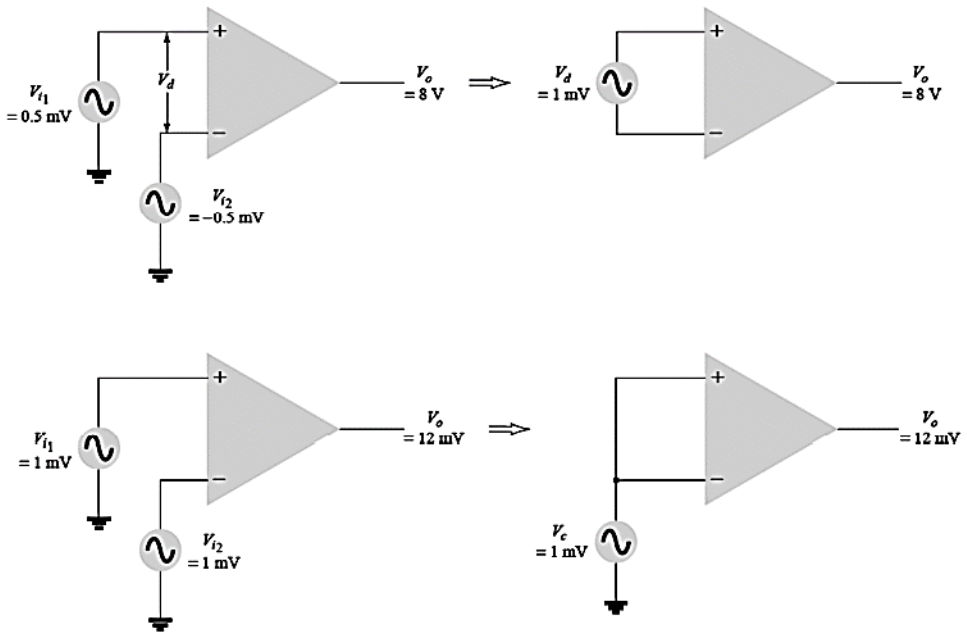


Figure 4

OR

18. a) Draw and explain the instrumentation amplifier. (10)

b) For a noninverting amplifier shown in Figure 5, Determine a) A_{CL} b) V_0 c) I_L D) I_0. (4)

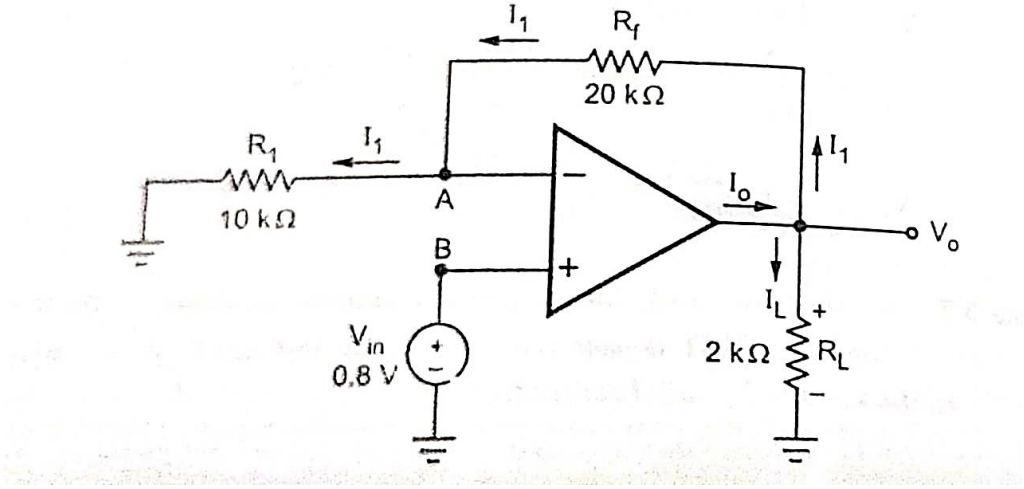


Figure 5

MODULE V

19. a) Examine how zero crossing detector used as a comparator. (7)

b) Outline the working of an ideal differentiator and practical differentiator using op-amp with corresponding input and output waveform. (7)

OR

20. a) Illustrate the working of triangle wave generator using op-amp (7)

with corresponding input and output waveform.

b) Analyze how Astable multivibrator called as a free running multivibrators? Explain it using timer 555 IC with neat sketch. (7)

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