Registration No : | | | | | | | | | | |

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B.Tech

RIT4G001/REC3C001/RCS4G001/RCI4G003

4th Semester Regular/Back Examination- 2023-24

ANALOG ELECTRONIC CIRCUITS

IT/ELECTRICAL & C.E/CSE,CSEAIME,CSEDS,CIVIL

Time : 3 Hour
Max Marks : 100
Q.Code : P161

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** **(2 x10)**

a) What is called as a voltage-controlled device & why?
b) Why is biasing required?
c) Write down the basic features of an amplifier.
d) Draw the small signal model for common source FET.
e) Write down the principle of Oscillation.
f) Draw an amplifier circuit with complete components like R_S & R_L .
g) Why is frequency response analysis required?
h) What are the advantages of negative feedback? Write any 2 applications of it.
i) Write the characteristics of an ideal Op-amp.
j) What is CMRR? Write its ideal & practical value.

Part-II

Q2 **Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 × 8)**

a) What do you mean by stabilization? Determine the stability factor of a circuit having more stable gain.

b) Determine Q-point of the given circuit in Fig-1. (Assume β=100).

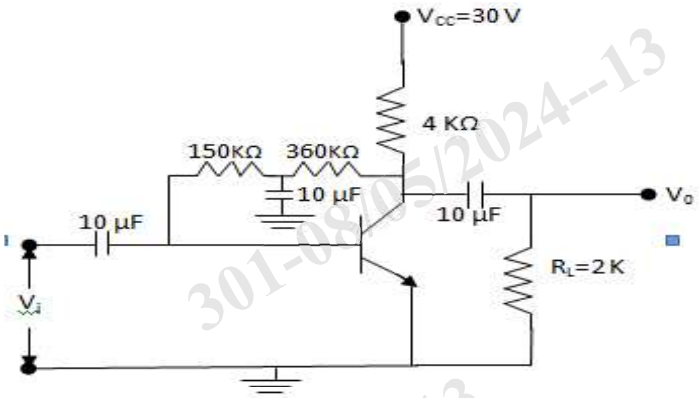


Fig. 1

c) Derive the output gain & input impedance of emitter follower circuit using small signal analysis.

d) Explain the operation of E-MOSFET & VI characteristics.

e) Draw a Current Mirror Circuit & justify its name with detailed explanations.

f) Design an Adder Circuit using op-amp, where its output $V_O = -(V_1+2V_2+3V_3)$ with R_f =40kΩ .

g) What is the importance of Miller effect in high frequency response analysis of BJT, explain?

h) Draw a cascade structure using FET & find its output gain.

i) Draw a gain versus frequency plot for high frequency analysis of a R-C network. Define 3-dB cut-off frequency & show it in the plot.

j) For a fixed bias circuit R_B=470KΩ , R_C=3KΩ , β=100 , V_{CC}=12V , R_S=0.3KΩ, R_L=4.7KΩ , C_b=2µF, C_c=4µF. Draw the complete circuit & find out its overall voltage gain.

k) If an amplifier with gain of -200 and feedback of β= -0.2 has gain change of 10% due to temperature variation , calculate the change in gain of the feedback amplifier.

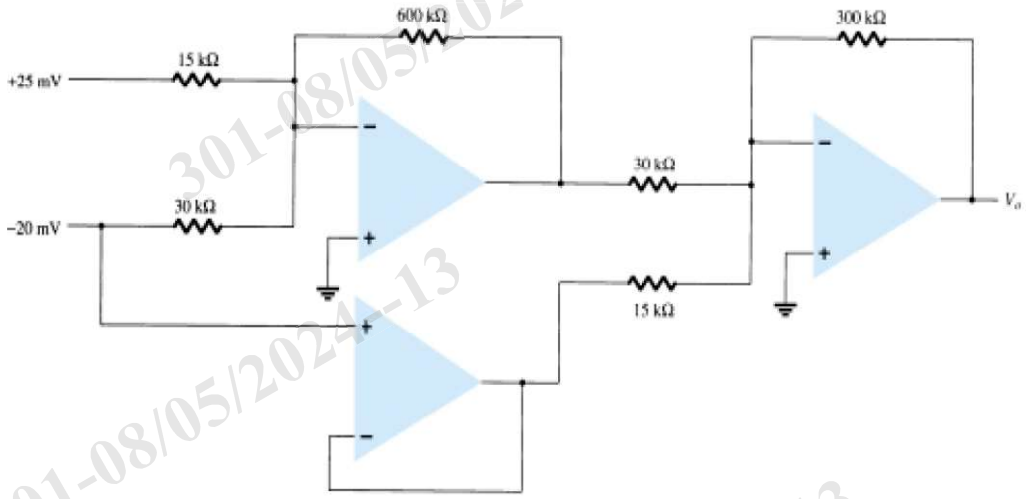
l) What is a power amplifier? Classify it with the required load line analysis.

Part-III
Long Answer Type Questions (Answer Any Two out of Four)

Q3 **a)** Determine V_{GSQ} , I_{DQ} , V_D for a voltage divider bias circuit, where R_1=2.1MΩ , R_2=270KΩ , R_D=2.4KΩ , R_S =1.5KΩ ,V_{DD}=16v , I_{DSS}=8mA , V_P= - 4V. **(8+8)**

b) Determine Z_i , A_{vi} for a voltage-divider BJT circuit where R_1=56KΩ, R_2=8.2KΩ , R_C=6.8KΩ, R_E=1.5KΩ, V_{cc}=22v, β=90, C_b=C_c=10µF. (Consider the Unbypass system where r_o =∞).

Q4 **a)** Determine V_o for the given circuit. **(10+6)**



b) Draw a differentiator circuit using Op-amp & find its output.

Q5 **a)** Find the high frequency response of a BJT amplifier. **(8+8)**

b) Draw Voltage shunt feedback circuit & justify why it is called so. Derive its output & input resistance after feedback.

Q6 **a)** Draw a complete circuit of Wein-bridge oscillator & derive its output frequency with necessary explanations. **(8+8)**

b) Explain the operation of a push-pull amplifier & derive its conversion efficiency. Also, highlight the distortion produced by the amplifier.