Hall Ticket No | | | | | | | | | | | Question Paper Code:AECC07

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
Dundigal-500043, Hyderabad

B.Tech III SEMESTER END EXAMINATIONS (REGULAR/SUPPLEMENTARY) - FEBRUARY 2023
Regulation:UG20
ANALOG ELECTRONICS

Time: 3 Hours (ELECTRICAL AND ELECTRONICS ENGINEERING) Max Marks: 70

Answer ALL questions in Module I and II
Answer ONE out of two questions in Modules III, IV and V
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

MODULE – I

1. (a) Illustrate the operation of a PN junction diode in forward and reverse bias condition with its V-I characteristics. [BL: Understand| CO: 1|Marks: 7]

   (b) Determine the parameters $I_B, I_C, V_{CE}, V_C, V_E, V_B, V_{BC}$ for the emitter bias circuit shown in Figure 1. [BL: Apply| CO: 1|Marks: 7]

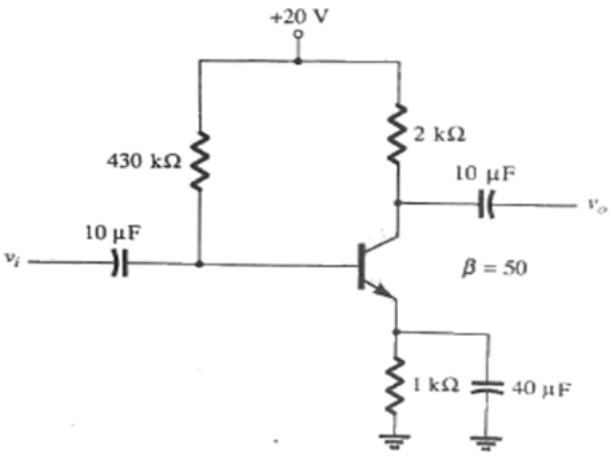

Figure 1

MODULE – II

2. (a) Develop the expression for input impedance and output impedance for the common drain amplifier with the help of AC equivalent model. [BL: Understand| CO: 2|Marks: 7]

   (b) For N-channel enhancement MOSFET V_{GS}(Th)=3V, I_D(ON)=3mA, V_{GS}(ON)=10V. Calculate the result value of k for the MOSFET and draw the transfer characteristics when V_{GS}= 5V, 8V,10V, 12V. [BL: Apply| CO: 2|Marks: 7]

MODULE – III

3. (a) With neat diagram explain series fed class A power amplifier and derive the expression for maximum efficiency. [BL: Understand| CO: 3|Marks: 7]

(b) Compute the following for class B power amplifier driven from a 24V power supply and driving a load of 8W, if the peak to peak output voltage across the load resistance is 22V maximum.

i) Input D.C power

ii) Output power

iii) Conversion efficiency. [BL: Apply| CO: 3|Marks: 7]

4. (a) Discuss in detail about different coupling schemes used in the amplifier along with neat circuit diagram. [BL: Understand| CO: 4|Marks: 7]

(b) Calculate the DC bias currents and voltages for the circuit shown in Figure 2 to provide V_o at one-half the supply voltage (9V). [BL: Apply| CO: 4|Marks: 7]

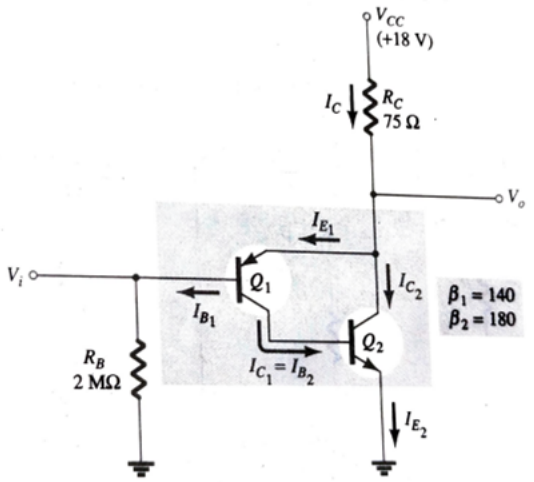

Figure 2

MODULE – IV

5. (a) Develop the expression for input resistance and output resistance of voltage series feedback amplifier. [BL: Understand| CO: 5|Marks: 7]

(b) A current series feedback amplifier shown in Figure 3 has the following parameters: R_1=20KΩ, R_2=20Kω, h_{ie}=2KΩ, R_L=1KΩ, R_e=100KΩ, h_{fe}=80, h_{re}=h_{oe}=0. Calculate GM, β, R_{if} and A_{vf}. [BL: Apply| CO: 5|Marks: 7]

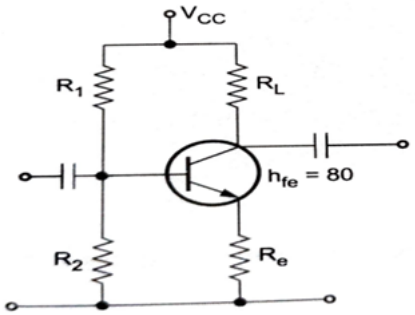

Figure 3

6. (a) Outline the operation of RC phase-shift oscillator circuit and derive the expression for the frequency of oscillations. [BL: Understand| CO: 5|Marks: 7]

(b) Design a RC phase shift oscillator to generate 5KHz sine wave with 20V peak to peak amplitude. Draw the designed circuit. Assume h_{fe}=150. [BL: Apply| CO: 5|Marks: 7]

MODULE – V

7. (a) Describe the operation of schmitt trigger using opamp and derive the expression for upper and lower threshold voltage. [BL: Understand| CO: 6|Marks: 7]

   (b) Calculate the output voltage of an inverting summing amplifier for the following set of voltages and resistors. Use R_f=1MΩ,

   i) V_1=1V, V_2=2V, V_3=3V, R_1=500KΩ, R_2=1MΩ, R_3=1MΩ

   ii) V_1=-2V, V_2=3V, V_3=1V, R_1=200KΩ, R_2=500kΩ, R_3=1MΩ [BL: Apply| CO: 6|Marks: 7]

8. (a) List the specifications of practical operational amplifier. With neat circuit diagram explain the operation of integrator. [BL: Understand| CO: 6|Marks: 7]

   (b) Design a practical differentiator for maximum frequency of 100Hz and draw the output waveform for 1V peak and 100Hz sine wave. [BL: Apply| CO: 6|Marks: 7]