Question Paper

Exam Date & Time: 15-Jan-2024 (09:30 AM - 12:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

INTERNATIONAL CENTRE FOR APPLIED SCIENECES
END SEMESTER THEORY EXAMINATIONS NOVEMBER/DECEMBER 2023
III SEMESTER B.Sc. (APPLIED SCIENCES) IN ENGG.
ANALOG ELECTRONIC CIRCUITS [IEC 231]

Marks: 50 **Duration: 180 mins.**

Answer all the questions.

Missing data may be suitably assumed.

1) A) For the Common Source amplifier shown in Fig.Q1a, $W/L = 30/0.18$,Vth=0.5V, Vgs=1.1V and λ=0, Id=0.5mA. Verify that M1 operates in saturation. (5)

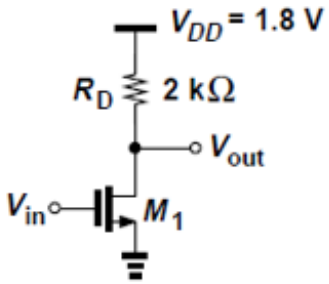

Fig.Q1a

B) Consider an NMOS transistor with Vth=0.7, Vgs=1.5V. Find the region of operation for: (5)

i)Vds=0.5V b) Vds=0.9V c)Vds=3V.

ii) Assume $\mu_n C_{ox}$ = 50μA/V², W/L=10/1, find the value of drain current that results in each of the 3 cases above.

2) A) i) For a Colpitts oscillator, determine the frequency of oscillation given that C_1 = 750 pF, C2 = 2500 pF, and L = 40 μH. (5)

ii)Draw the circuit of Colpitts Oscillator

B) Explain different types of biasing circuit in a transistor. (5)

3) (5)

A) Plot the frequency response of RC coupled amplifier with and without feedback. Indicate the salient features on the plot. In a 3-stage RC coupled amplifier, if the individual stage voltage gains are: $A_1 = 50dB, A_2 = 0dB$ and $A_3 = 10dB$ respectively, find the output voltage at each stage and overall gain in decibels if the input voltage applied is $V_i = 10\sin(2\pi ft)$ millivolts.

B) Draw the circuit diagram of Low Frequency Model of MOSFET and explain. Write the expressions for the cutoff frequency of the amplifier. (5)

4) With the help of a circuit diagram, explain the working of transformer coupled Class B push pull power amplifier. Derive an expression for the maximum power efficiency. Mention one drawback of this amplifier. (5)

A)

B) Draw the block schematic of i) Voltage shunt ii) Current series feedback amplifiers. What is the effect of series and shunt feedback on the input and output resistance of an amplifier? (5)

5) Derive the expressions for gain, input impedance and output impedance of Source follower circuit using MOSFET. (5)

A)

B) Draw the block schematic of i) Voltage shunt ii) Current series feedback amplifiers. What is the effect of series and shunt feedback on the input and output resistance of an amplifier? (5)

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