

Printed Pages: 4**NEC-402****(Following Paper ID and Roll No. to be filled in your Answer Books)****Paper ID : 131406****Roll No.** **B.TECH.****Theory Examination (Semester-IV) 2015-16****ELECTRONIC CIRCUITS****Time : 3 Hours****Max. Marks : 100****Section-A****Q1. Attempt all parts. All parts carry equal marks.****(10×2=20)**

- (a) What do you mean by voltage follower circuit ? explain in brief.
- (b) Why Op Amp is rarely used in open loop configuration?
- (c) What is Barkhausen criteria for sinusoidal oscillations
- (d) Draw the current mirror circuit and write its output current equation.
- (e) State the properties of negative feedback.
- (f) What are the advantages of using an active load in differential amplifier circuit?
- (g) What are the types of feedback ?

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- (f) Explain the Nonideal characteristics of MOS differential pair.
- (g) Draw a circuit diagram of Wein bridge oscillator and drive an expression of frequency of oscillation. Calculate the frequency of oscillation for given values of $R_1=R_2=200\text{ k}\Omega$, $C_1=C_2=200\text{ pF}$.
- (h) Design the circuit shown in fig.1 so that transistor operates at $I_D = 0.4\text{ mA}$ and $V_D = +0.5\text{ V}$. The NMOS transistor has $V_t = 0.7\text{ V}$, $\mu_nC_{\text{ox}} = 100\mu\text{A/V}^2$, $L = 1\mu\text{m}$ and $W = 32\mu\text{m}$. Neglect the channel length modulation.

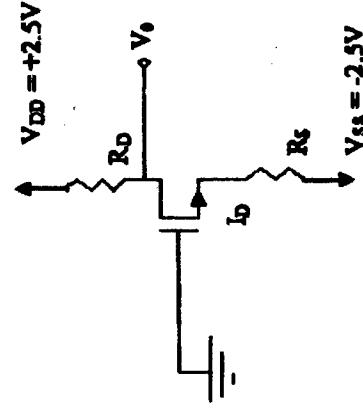


Fig. 1

Section-C

Note: Attempt any two questions from this section. (15×2=30)

Q2. Attempt any five questions from this section. (10×5=50)

- (a) Discuss the effect of finite loop gain on the performance of non-inverting OP-AMP.
- (b) A MOSFET is to operate at $I_D = 1\text{ mA}$ and is to have $g_m = 1\text{ mA/V}$. If $K_n = 50\mu\text{A/V}^2$. Find the required W/L ratio and the overdrive voltage.
- (c) Draw the high frequency model of MOSFET and drive an expression of f_H .
- (d) BJT transistor amplifier stage has $R_E = R_C = 1.5\text{k}\Omega$, $R_S = 6000\Omega$, $R_L = 2\text{k}\Omega$ and transistor parameter as $\beta = 100$ and $r_e = 1\text{k}\Omega$. Determine the value of C_{Cl} , C_{C2} and C_E needed to obtain $f_L = 50\text{Hz}$ and also draw the circuit.
- (e) Explain the operation of BJT as a switch and as an amplifier.

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- (h) Draw the Small signal π Model of BJT.
- (i) How does the slew rate effects Finite or Full power Band Width of Op Amp ?
- (j) An enhancement type NMOS transistor with $V_t = 0.7\text{ V}$ has its source terminal grounded and a 1.5 V dc applied to the gate. In what region does the device operate for $V_D = 0.9\text{ V}$.

Section-B

Q2. Attempt any five questions from this section. (10×5=50)

- (a) Discuss the effect of finite loop gain on the performance of non-inverting OP-AMP.
- (b) A MOSFET is to operate at $I_D = 1\text{ mA}$ and is to have $g_m = 1\text{ mA/V}$. If $K_n = 50\mu\text{A/V}^2$. Find the required W/L ratio and the overdrive voltage.
- (c) Draw the high frequency model of MOSFET and drive an expression of f_H .
- (d) BJT transistor amplifier stage has $R_E = R_C = 1.5\text{k}\Omega$, $R_S = 6000\Omega$, $R_L = 2\text{k}\Omega$ and transistor parameter as $\beta = 100$ and $r_e = 1\text{k}\Omega$. Determine the value of C_{Cl} , C_{C2} and C_E needed to obtain $f_L = 50\text{Hz}$ and also draw the circuit.
- (e) Explain the operation of BJT as a switch and as an amplifier.

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Q4. (a) Consider the common emitter circuit using a BJT having $I_s=10^{-15}A$. A collector resistance $R_c=6.8 K\Omega$ and power supply $V_{CC}=10V$.

(i) Determine the value of bias voltage V_{BE} required to operate the transistor at $V_{CE}=3.2V$. what is the corresponding value of I_C .

(ii) Find the voltage gain A_v at this bias point.

(iii) If the input sine wave of 5mA peak amplitude is superimposed one V_{BE} . Find the amplitude of output sine wave signal.

(b) Draw the circuit for CB amplifier and find expression for short circuit gain.

Q5. (a) Draw the T equivalent circuits of common source amplifier with a source amplifier with a source resistance and obtain the expressions for R_{in} , R_{out} , and G_v .

(b) An inverting amplifier has feedback resistor $R_f=500K\Omega$ and $R_i=5K\Omega$. Find the amplifier circuit voltage gain, input resistance and output resistance. Also find the output voltage and input current if the input voltage is given as .1 volts. Assume the OP-AMP to be an ideal one.

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