

(3 Hours)

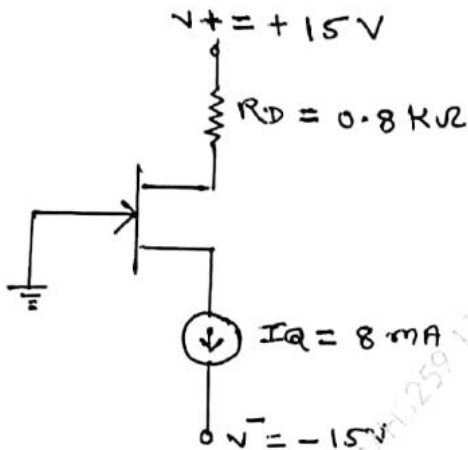
[Total Marks : 80

- I.B. : (1) Question No. 1 is compulsory.
 (2) Attempt any three questions out of remaining five questions.
 (3) Assume suitable data if required and mention the same in answer sheet.

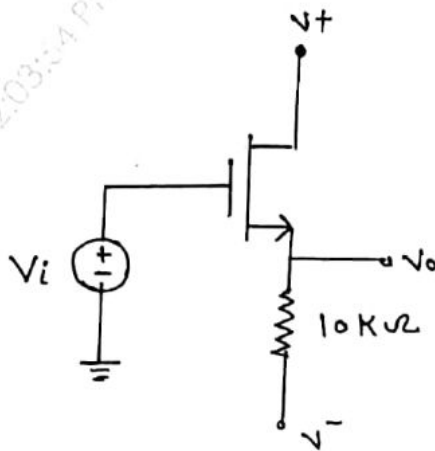
Attempt any five questions

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- (a) For the circuit given below, the transistor parameters are $V_p = -3.5\text{V}$, $I_{DSS} = 18\text{mA}$ and $\lambda = 0$. Calculate V_{GS} and V_{DS} .

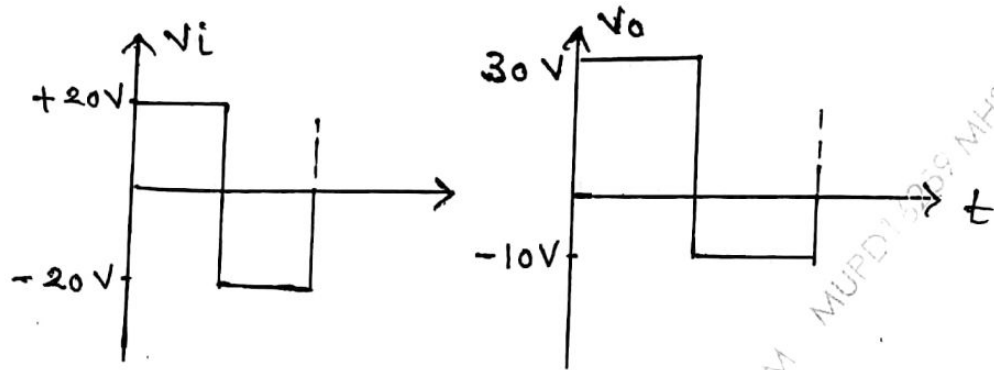


- (b) The small-signal parameters of the NMOS transistor in the source follower circuit shown in fig. below are $g_m = 5\text{mA/V}$ and $r_o = 100\text{ k}\Omega$. Determine the voltage gain and output resistance.

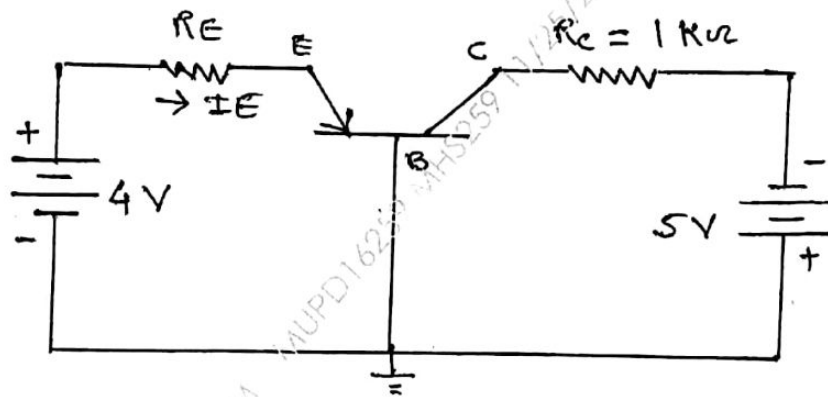


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- (c) Design a diode clamper to generate a steady-State output voltage V_o from the input voltage V_i in fig. Shown below if diode is Ideal.



- (d) For the circuit shown, determine R_E such that the emitter current is limited to $I_E = 1mA$, Also find I_B (Given $\alpha = 0.9920$)



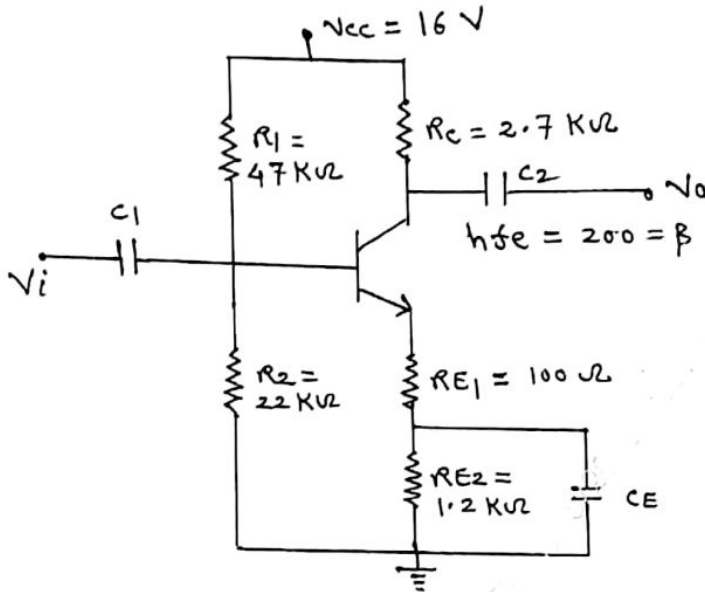
- (e) Describe the channel length modulation effect and define the parameters λ .
 (f) Draw a neat circuit diagram of emitter follower configuration and its hybrid - π model.

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- a) Determine the following for the network given below
- Q- Point
 - A_v, A_i, Z_i, Z_o .

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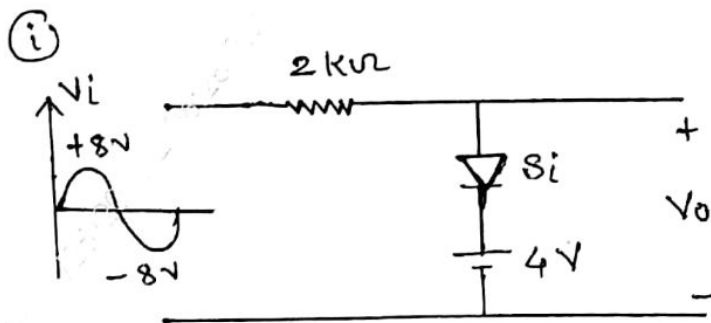


- (b) Explain the working of Wein Bridge oscillator. Derive the expression for frequency of oscillation and condition of oscillation.

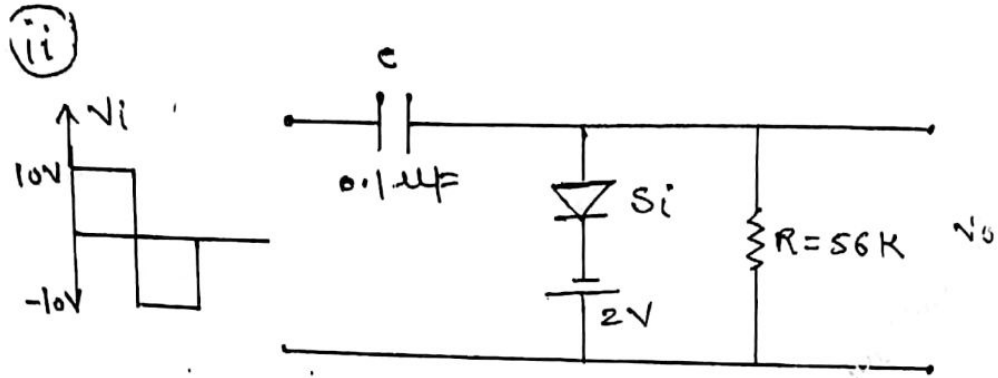
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- (a) Draw output waveform for clipper and clamper circuits shown.

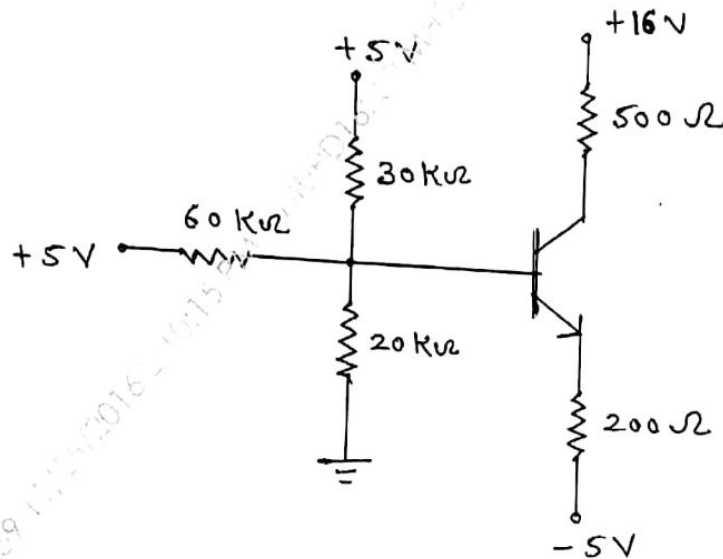
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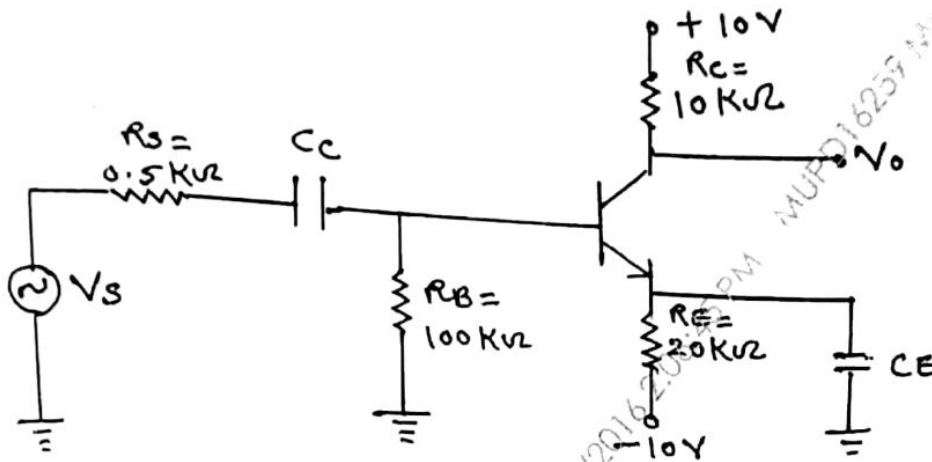


- (b) Explain construction and characteristics of n-channel Depletion MOSFET. Draw transfer characteristics and drain characteristics. 10
- 4 (a) Find I_{CQ} and V_{CEQ} for the circuit shown in figure if $\beta = 100$ 10

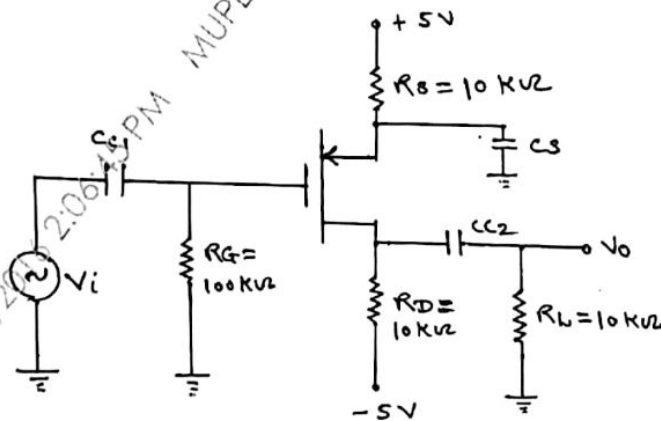


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- (b) For the circuit in fig. let $\beta = 100$, $V_A = 100V$, $V_{BE(on)} = 0.7V$. Determine **10**
- Small signal voltage gain
 - Input resistance seen by the signal source
 - output resistance



5. (a) For the amplifier circuit shown below **10**
- Determine the values of K_p such that $V_{SDQ} = 6V$
 - Determine the resulting value of I_{DQ} and small signal voltage gain.



$V_{TP} = -2V, \lambda = 0$

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(b) Draw circuit diagram of common source amplifier with voltage divider bias with unbypassed source resistance 'Rs' using n-channel EMOSFET. Derive expression for voltage gain, input resistance and output resistance.

6. Write short note on any four :-

- (i) Energy band diagram of MOS capacitor
- (ii) Construction and operation of Schottky diode
- (iii) Crystal Oscillator
- (iv) Hybrid parameters
- (v) Stability factor of biasing circuit.

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