

(3 Hours)



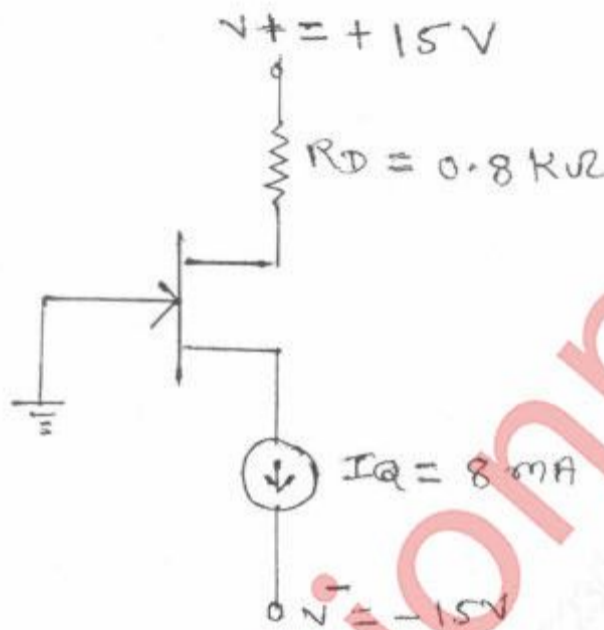
[ Total Marks : 80

- N.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.

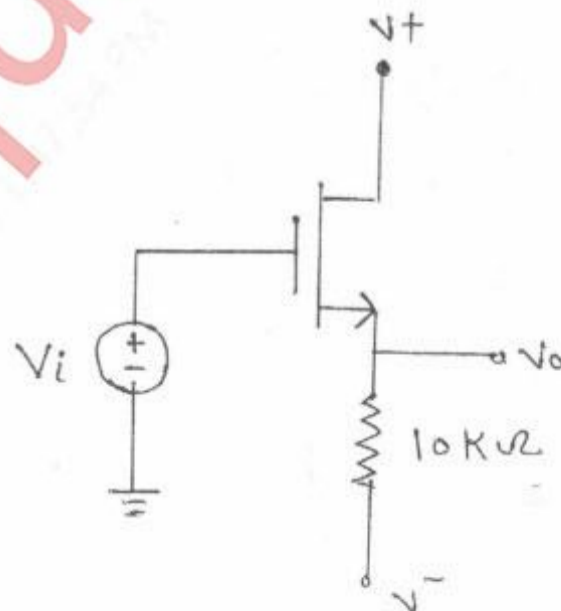
1. Attempt **any five** questions

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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  $V_{DS}$ .

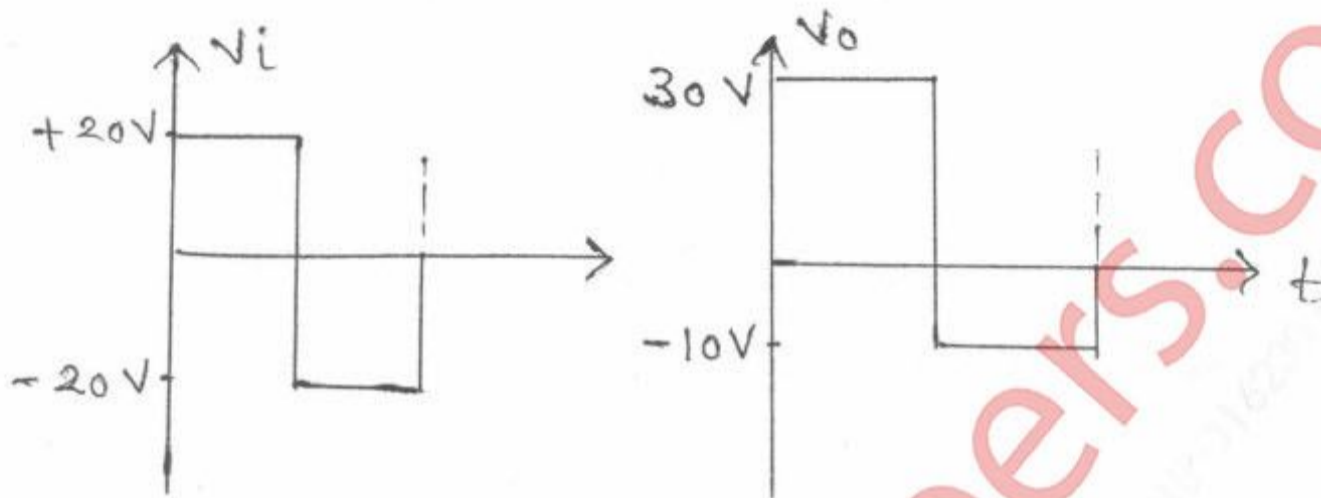


- (b) The small-signal parameters of the NMOS transistor in the source follower circuit shown in fig. below are  $g_m = 5\text{mA/V}$  and  $r_o = 100\text{K}\Omega$ . Determine the voltage gain and output resistance.

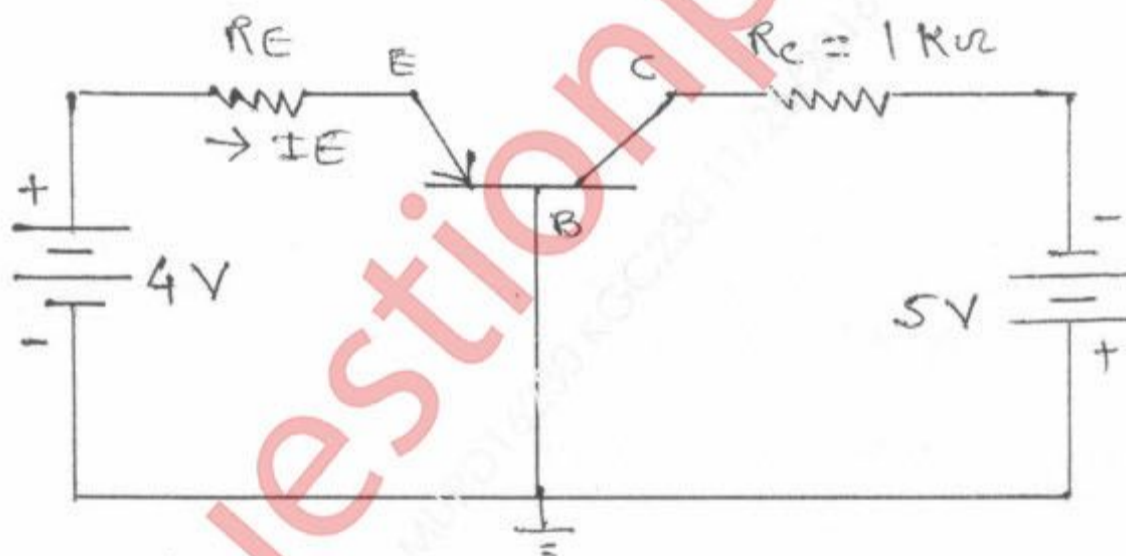


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- (c) Design a diode clamper to generate a steady-State output voltage  $V_o$  from the input voltage  $V_i$  in fig. Shown below if diode is Ideal.



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

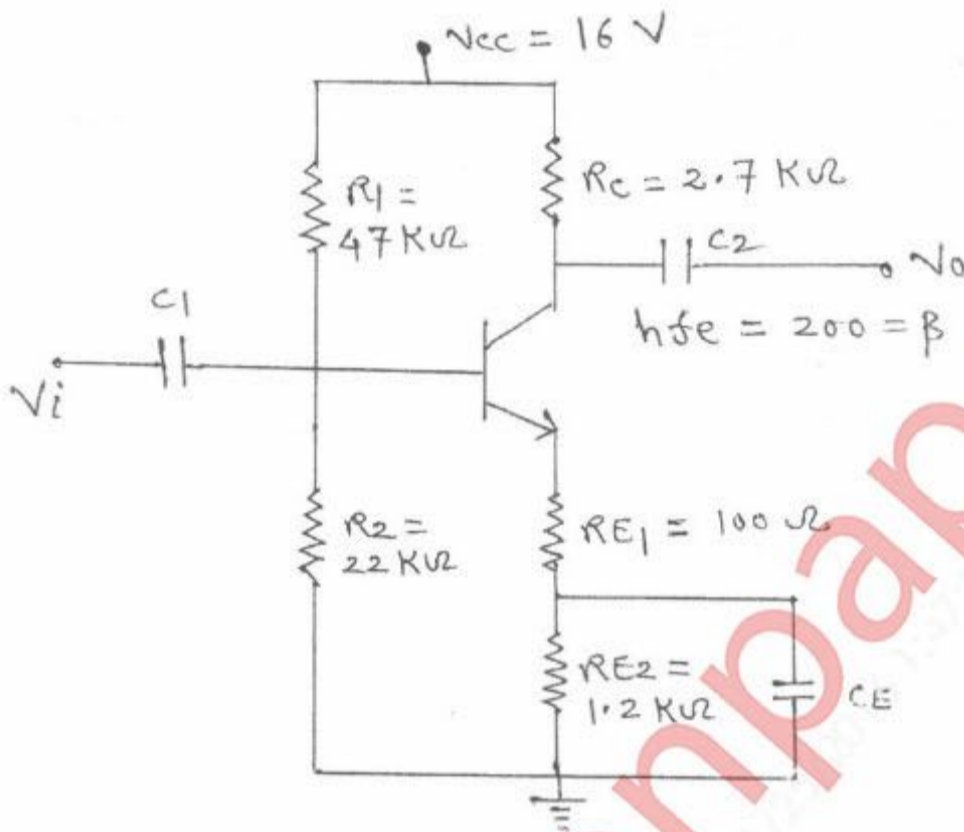


- (e) Describe the channel length modulation effect and define the parameters  $\lambda$ .
- (f) Draw a neat circuit diagram of emitter follower configuration and its hybrid -  $\pi$  model.

2 (a) Determine the following for the network given below

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- (i) Q- Point
- (ii)  $A_v, A_i, Z_i, Z_o$ .

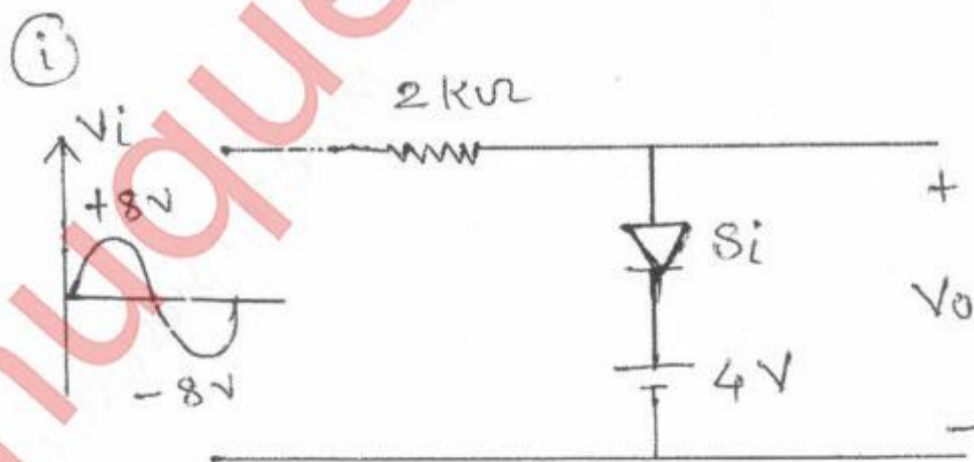


(b) Explain the working of Wein Bridge oscillator. Derive the expression for frequency of oscillation and condition of oscillation.

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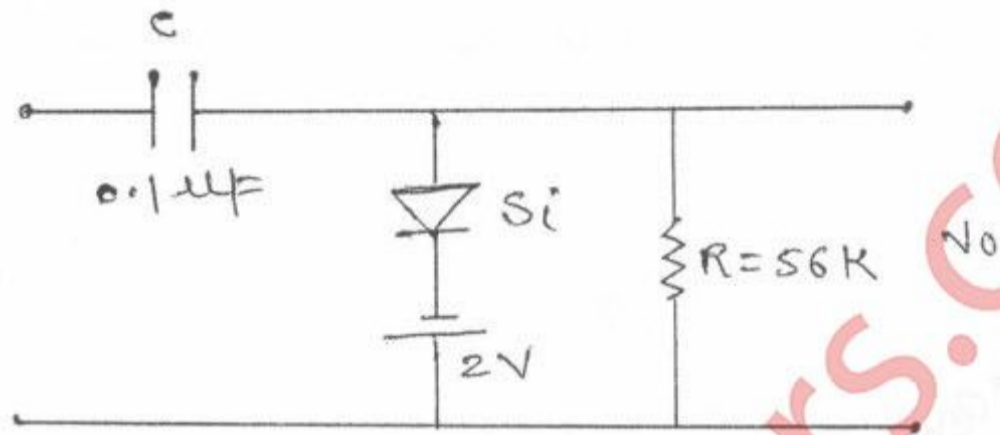
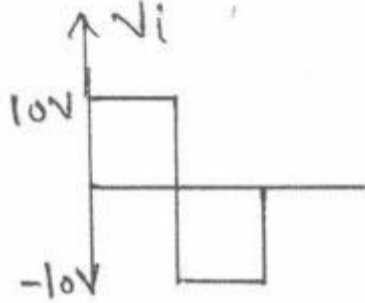
3 (a) Draw output waveform for clipper and clamper circuits shown.

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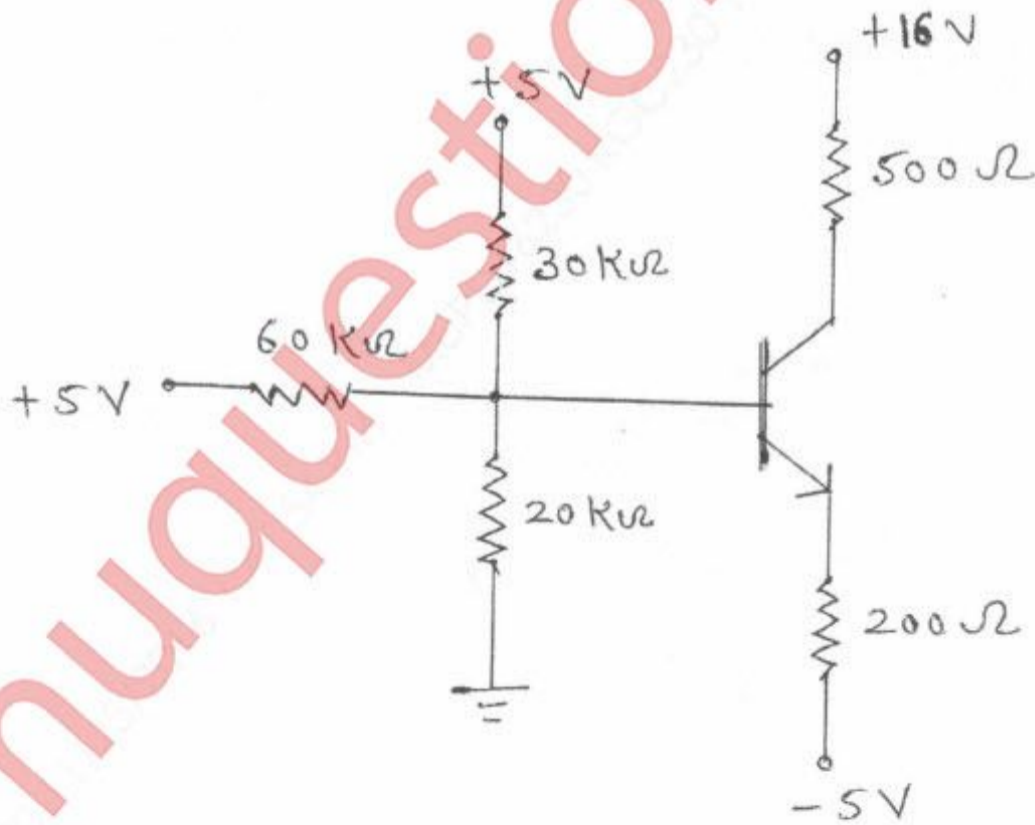
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(ii)



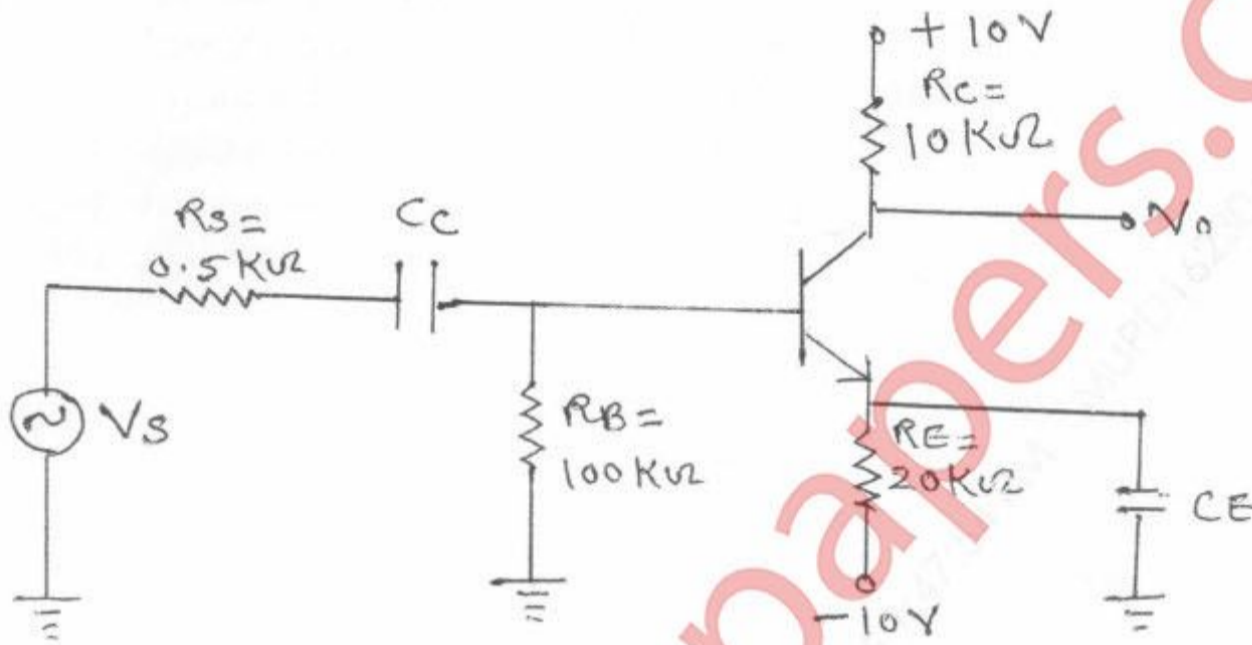
(b) Explain construction and characteristics of n-channel Depletion MOSFET. 10  
 Draw transfer characteristics and drain characteristics.

4 (a) Find  $I_{CQ}$  and  $V_{CEQ}$  for the circuit shown in figure if  $\beta = 100$  10



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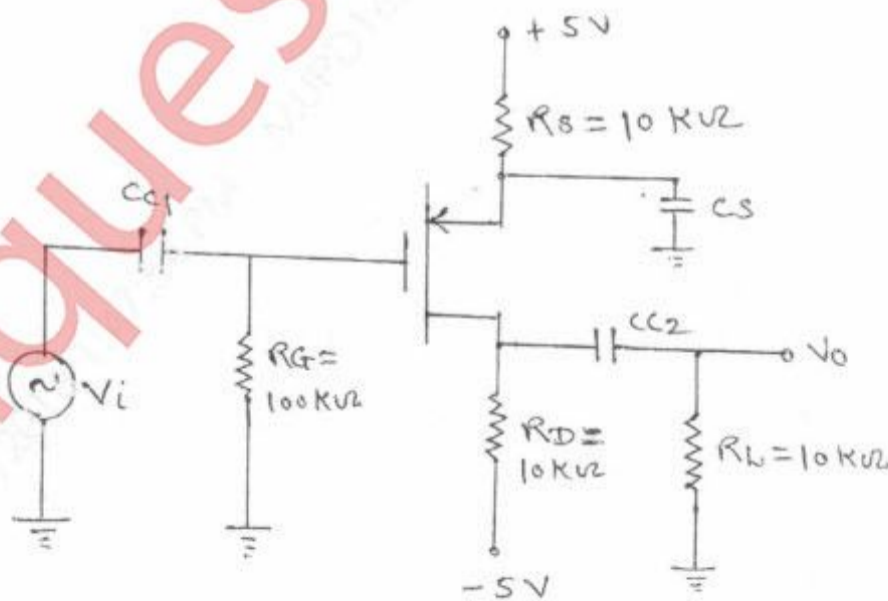
- (b) For the circuit in fig. let  $\beta = 100$ ,  $V_A = 100V$ ,  $V_{BE}(\text{on}) = 0.7V$ . Determine 10
- (i) Small signal voltage gain
  - (ii) Input resistance seen by the signal source
  - (iii) output resistance



5. (a) For the amplifier circuit shown below

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- (i) Determine the values of  $K_n$  such that  $V_{SDQ} = 6V$
- (ii) 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 ' $R_s$ ' using n-channel EMOSFET. Derive expression for voltage gain, input resistance and output resistance.

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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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