

(3 Hours)

- Q.B. : (1) Question No. 1 is compulsory.  
 (2) Solve any three questions from the remaining five  
 (3) Figures to the right indicate full marks  
 (4) Assume suitable data if necessary and mention the same in answer sheet.

Q.1 Attempt any 5 questions [20]

- a) Draw switching characteristics of a diode and explain the reverse recovery time.  
 b) Calculate  $V_{CEQ}$  for the common base circuit shown in Fig. 1b if the transistor parameter is  $\beta=120$

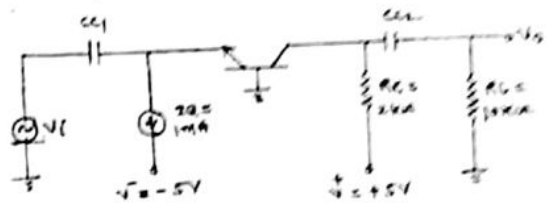


Fig. 1b

- c) Draw small signal model of JFET and explain the significance of each parameter.  
 d) Compare CE, CB and CC configuration.  
 e) Draw small signal hybrid pi model of BJT including early effect.  
 f) What are the Barkhausen's criteria for sustained oscillation?

Q.2 a) Draw the output of the clipper circuit shown in Fig. 2a. If a sine wave of  $15\sin\omega t$  is applied as an input. Assume practical diode with suitable cut in voltage. [10]

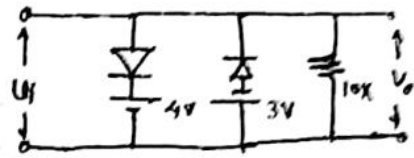


Fig. 2a

b) Derive the expression for frequency of oscillation for a Wein Bridge oscillator [10]

Q.3 a) Find  $I_{DQ}$ ,  $V_{GSQ}$ ,  $V_D$  and  $V_s$  for the circuit shown in Fig 3a [10]

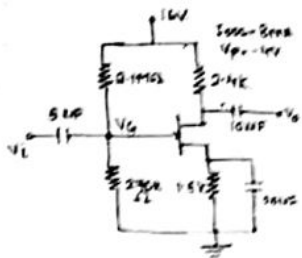


Fig. 3a

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b) Explain the construction and characteristics of n channel Enhancement MOSFET. Draw transfer and drain characteristics. [10]

Q.4 a) Derive expressions for voltage gain, input resistance and output resistance for source follower circuit using n channel MOSFET [10]

Fig.4a

b) Determine the hybrid pi parameters for the circuit shown in Fig 4b. The transistor parameters are  $V_{BE(on)} = 0.7 V$ ,  $\beta = 100$  and  $V_A = 100V$ . [10]

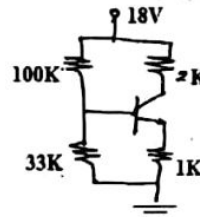


Fig. 4b

Q.5 a) For the circuit shown below in Fig.5b, the transistor parameters are  $V_{BE(on)} = 0.7 V$ ,  $\beta = 140$  and  $V_A = \infty$ . Determine  $Z_i$ ,  $Z_o$  and  $A_v$  [10]

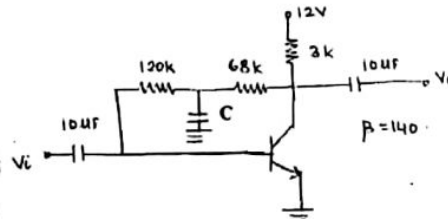


Fig. 5a

b) Draw and explain energy band diagram of MOS capacitor in accumulation, depletion and inversion region. [10]

Q.6 Short notes on: (Attempt any four) [20]

- a) Construction and operation of schottky diode
- b) LC oscillators
- c) AC and DC load line
- d) Small signal equivalent circuit of CC amplifier
- e) Regions of operation of FET