

S.E. Sem. III [EXTC]
Analog Electronics - I
Prelim Question Paper

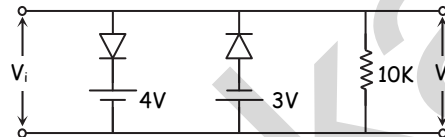
Time : 3 Hrs.]

[Marks : 80

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

1. (a) Compare BJT and JFET. [5]

(b) Obtain output for the clipper circuit shown in Figure. If a sine wave of $15 \sin \omega t$ is applied as an input. Assume practical diode with suitable cut in voltage.



[5]

(c) Write short note on small signal model of a diode. [5]

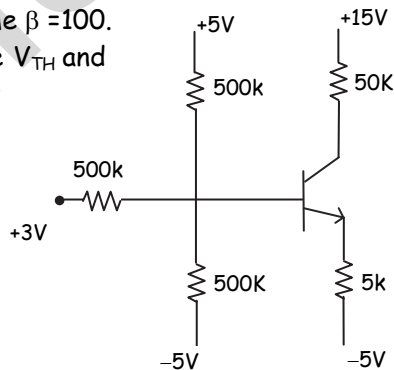
(d) Write short note on Regions of operation of FET. [5]

2. (a) Define stability factor. Derive the equation for stability factor fixed base bias and emitter bias. State which biasing technique is more stable? Justify your answer. [10]

(b) For the circuit shown in Figure, assume $\beta = 100$. [10]

(i) Find Thevenin's equivalent voltage V_{TH} and resistance R_{TH} for base circuit

(ii) Determine I_{CQ} and V_{CEQ}



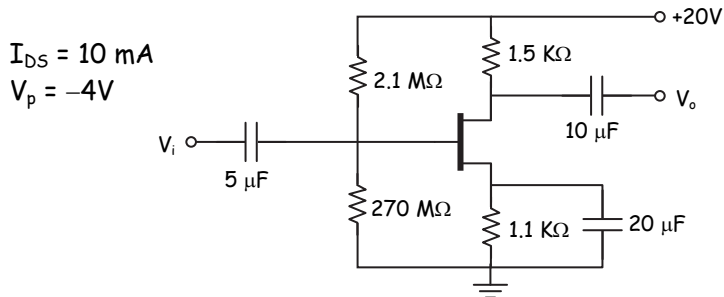
3. (a) Derive the equations for A_v , A_i , R_i and R_o for a Emitter Follower. [10]

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

4. (a) Explain the basic operation and characteristics of n-channel depletion type MOSFET. [10]

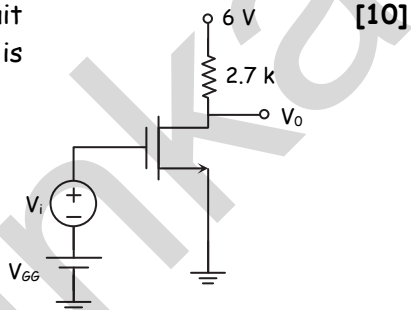
(b) Draw a neat circuit diagram of Colpitts oscillator and derive an expression for its output frequency. [10]

5. (a) Determine I_{DQ} , V_{GSQ} , V_D and V_S for the network given below : [10]



(b) Obtain g_m , r_o and A_v for the amplifier circuit shown in figure. In which region the device is operating? Justify.

$V_{GSR} = 3 \text{ V}$
 $V_{TN} = 1 \text{ V}$
 $K_n = 0.8 \text{ mA/V}^2$
 $\lambda = 0.018 \text{ V}^{-1}$



6. Write short notes on any **FOUR** : [20]

- (a) Mid-Point Biasing of JFET.
- (b) Barkhusen criteria for sustained oscillations.
- (c) Small signal equivalent circuit of CB amplifier
- (d) Crystal oscillator
- (e) BJT as a switch

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