

Duration 3 Hours

[Maximum Marks 80]

NOTE:-1) Question 1 is compulsory

- 2) Solve **any three** from the remaining five questions
- 3) Assume suitable data if necessary.
- 4) Figures to the right indicate full marks

Q.1. Attempt any four (04) out of the following

- (a) Explain high frequency equivalent circuit of BJT. 5
- (b) Discuss the effect of negative feedback on output resistance. 5
- (c) Explain Darlington pair amplifier. 5
- (d) State and explain the Barkhausen's criterion. 5
- (e) Explain current mirror. 5

Q.2. (a) Explain Class B push pull power amplifier and derive expression for efficiency. 10

(b) Explain Small signal analysis for MOSFET active load circuit. 10

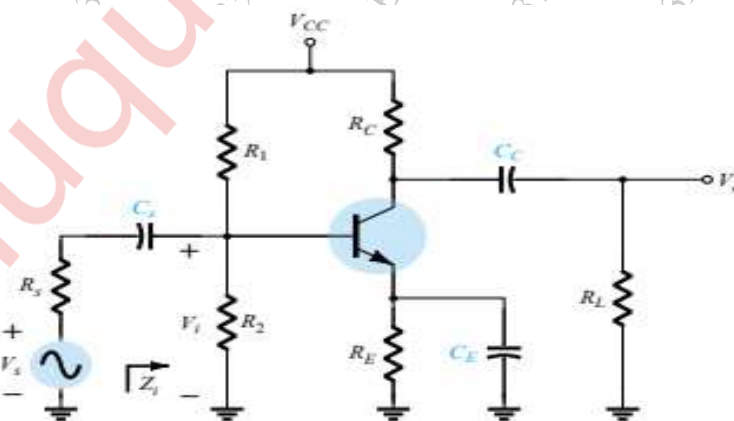
Q.3. (a). Determine the lower cut off frequency for the network shown in figure below using the following parameters

$$C_S = 10\mu\text{F}, C_E = 20\mu\text{F}, C_C = 1\mu\text{F}$$

$$R_S = 1\text{k}\Omega, R_1 = 40\text{k}\Omega, R_2 = 10\text{k}\Omega, R_E = 2\text{k}\Omega, R_C = 4\text{k}\Omega, R_L = 2.2\text{k}\Omega$$

$$\beta = 100, r_0 = \infty, V_{CC} = 20\text{V}.$$

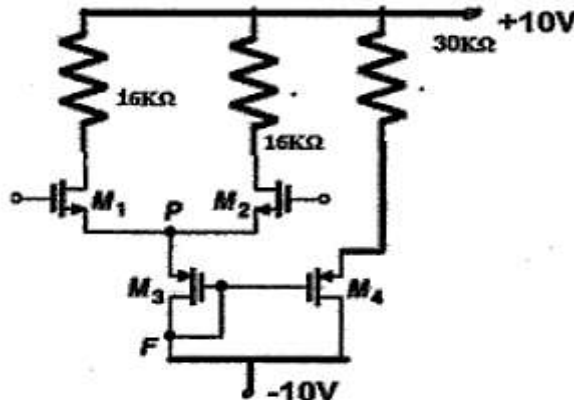
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(b). Explain working of Wien Bridge oscillator and give expression for frequency of Oscillations. 10

Q.4. (a). Find I_Q for given circuit. 10

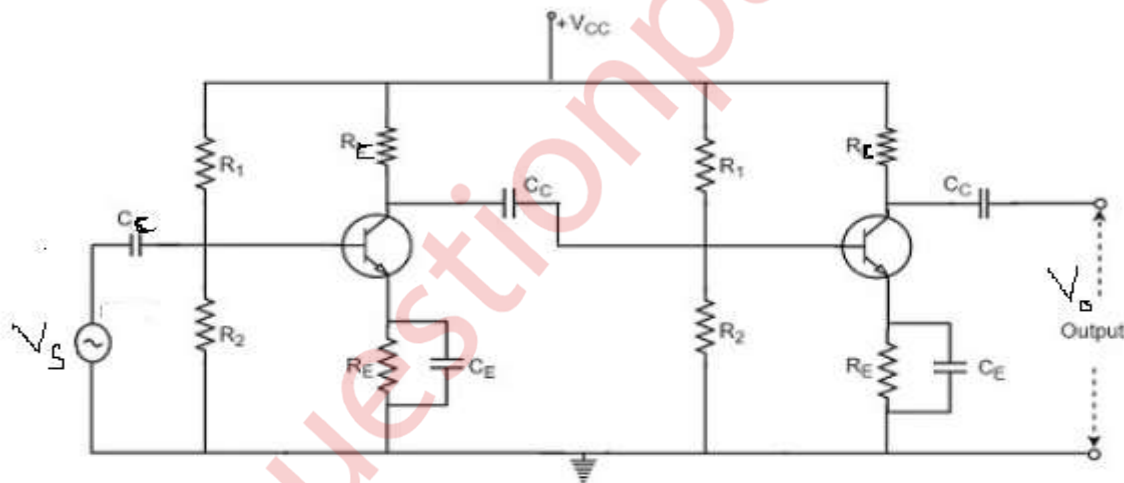
$K_{n1}=K_{n2}=0.1 \text{ mA/V}^2$, $K_{n3}=K_{n4}=0.3 \text{ mA/V}^2$, $V_{TN} = 1\text{V}$, $\lambda = 0$ for M_1, M_2, M_3 and $\lambda = 0.01/\text{V}$ for M_4 . Given data $R_D=16 \text{ K}\Omega$, $R_1=30 \text{ K}\Omega$



(b). What is the use of negative feedback in amplifier? Draw block diagram for current shunt feedback and find A_f , R_{if} , and R_{of} . 10

Q.5. (a). Determine voltage gain, input and output impedance for the two stage amplifier shown below. The transistors have parameters as follows: 10

$\beta_1=\beta_2=220$, $R_1=22\text{K}\Omega$, $R_2=2.2\text{K}\Omega$, $R_C=1\text{K}\Omega$, $R_E=150\Omega$, $C_c=5\mu\text{F}$, $C_E=100\mu\text{F}$, $V_{cc}=15\text{V}$.



(b). Explain working of DIAC with construction and V-I characteristics. Also give its applications. 10

Q.6. Write short notes on any **three** of the following: 20

- (a). Cascode BJT Amplifier
- (b). Cross over distortion in Class B power amplifier
- (c). Types of couplings in multistage amplifiers
- (d). Factors contributing to high frequency response analysis