

23/6/2016

4E4120

Roll No. _____

Total No of Pages: **4**

4E4120

B.Tech. IV-Sem (Main & Back) Exam; June-July 2016

Electrical & Electronics Engineering

4EX1A Analog Electronics

Common with EE, EX, EC, EI

Time: 3 Hours

Maximum Marks: 80

Min. Passing Marks (Main & Back): 26

Min. Passing Marks (Old Back): 24

Instructions to Candidates:-

Attempt any five questions, selecting one question from each unit. All Questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.

Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination.

(Mentioned in form No.205)

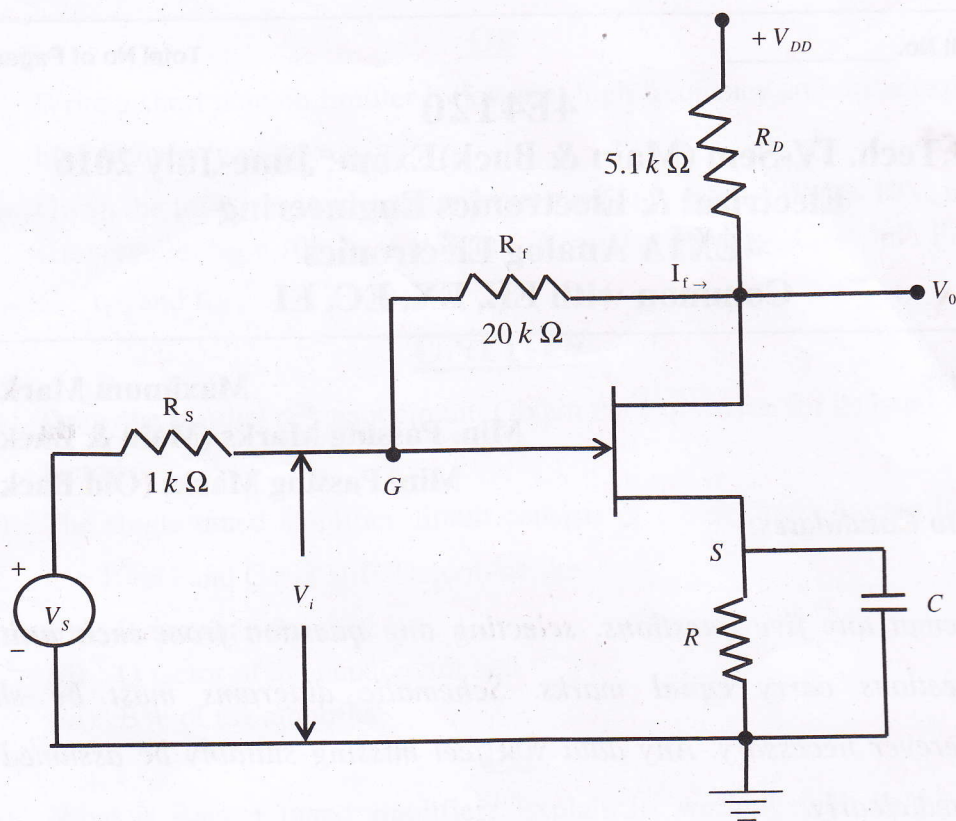
1. NIL

2. NIL

UNIT-I

Q.1 (a) What are the four possible topologies of a feedback amplifier? Explain with neat sketches. [8]

(b) Calculate the voltage gain with and without feedback for the circuit given in figure, with values, $g_m = 5\text{mA/V}$, $R_D = 5.1\text{K}\Omega$, $R_s = 1\text{K}\Omega$, $R_f = 20\text{K}\Omega$, $r_d = 1\text{M}\Omega$. [8]



OR

- Q.1 (a) Sketch the circuit of a current series feed – back amplifier. Obtain the expression for the voltage gain and the input resistance of this amplifier. [8]
- (b) Calculate the voltage gain, input & output resistance of a voltage series feedback amplifiers having $A_v = 300$, $R_i = 1.5\text{ K}\Omega$, $R_o = 50\text{ K}\Omega$ and $\beta = 1/15$. [8]

UNIT-II

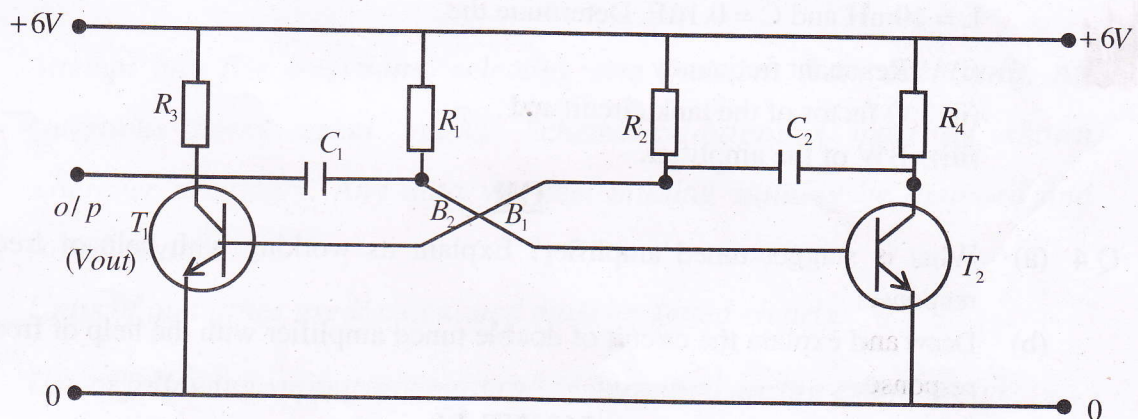
- Q.2 (a) Sketch the circuit for a wein bridge oscillator. What determines the frequency of Oscillators? Will oscillations take place if the bridge is balanced? [8]
- (b) In a transistor colpitts oscillator has the following parameters. [8]
- $L = 100\mu\text{H}$, $L_{\text{RFC}} = 0.6\text{mH}$, $C_2 = 0.001\mu\text{F}$, $C_1 = 0.01\mu\text{F}$, $C_c = 10\mu\text{F}$

Determine –

- (i) Operating frequency
- (ii) Feedback – fraction
- (iii) Minimum gain to sustain oscillations and emitter resistance if $R_C = 2.5K\Omega$.

OR

- Q.2 (a) What is Schmitt triggering? Explain the working of Schmitt trigger with the help of a neat circuit diagram and waveforms. [8]
- (b) In a astable multi vibrator circuit diagram shown below, $R_1 = R_2 = 5K\Omega$, $R_3 = R_4 = 0.4K\Omega$ and $C_1 = C_2 = 0.02\mu F$. [8]



Determine –

- (i) Time period and frequency of circuit oscillation.
- (ii) Minimum value of transistor β .

UNIT-III

- Q.3 (a) Draw neat diagram of hybrid - π model for a transistor at high frequency in CE configuration, discuss in brief. [10]
- (b) In a hybrid π model, prove that diffusion capacitance at an emitter junction - $C_{de} = g_m W^2 / (2DB)$ where, g_m = transistor transconductance; W = base width; D_B = diffusion constant for minority in base region. [6]

OR

- Q.3 (a) Write a short note on Emitter follower at high frequency and derive expression for high frequency voltage gain. [8]
- (b) Given the following transistor measurement at $I_C = 5\text{mA}$, $V_{CE} = 10\text{V}$, and at room temperature. $h_{fe} = 100$, $h_{ie} = 600\Omega$, $A_i = 10$ at 10MHz , $C_C = 3\text{pF}$. Find F_B , F_T , C_e , $r_{b'e}$ and $r_{bb'}$. [8]

UNIT-IV

- Q.4 (a) Draw the parallel resonant circuit. Obtain the expression for its band width and Q factor. [6]
- (b) The single tuned amplifier circuit consists of tuned circuit having $R = 50\Omega$, $L = 10\text{mH}$ and $C = 0.1\mu\text{F}$. Determine the [10]
- (i) Resonant frequency
 - (ii) Q factor of the tank circuit and
 - (iii) BW of the amplifier.

OR

- Q.4 (a) What is stagger tuned amplifier? Explain its working with help of frequency response. [8]
- (b) Draw and explain the circuit of double tuned amplifier with the help of frequency response. [8]

UNIT-V

- Q.5 (a) Derive an expression for output power of class A large signal amplifier in terms of V_{max} , V_{min} , I_{max} and I_{min} . [8]
- (b) What is meant by crossover distortion in class B amplifier? Explain how it is overcome in class AB operation. [8]

OR

- Q.5 (a) Explain complimentary and quasi complimentary symmetry push pull power amplifier with the help of circuit diagrams. [8]
- (b) A class B push – pull amplifier is supplied with $V_{CC} = 50\text{V}$. The signal swings the collector voltage down to $V_{min} = 5\text{V}$. The total dissipation in both transistors is 40W . Find the total power conversion efficiency. [8]