Roll No. _____

Total No of Pages: 4

4E4120

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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)
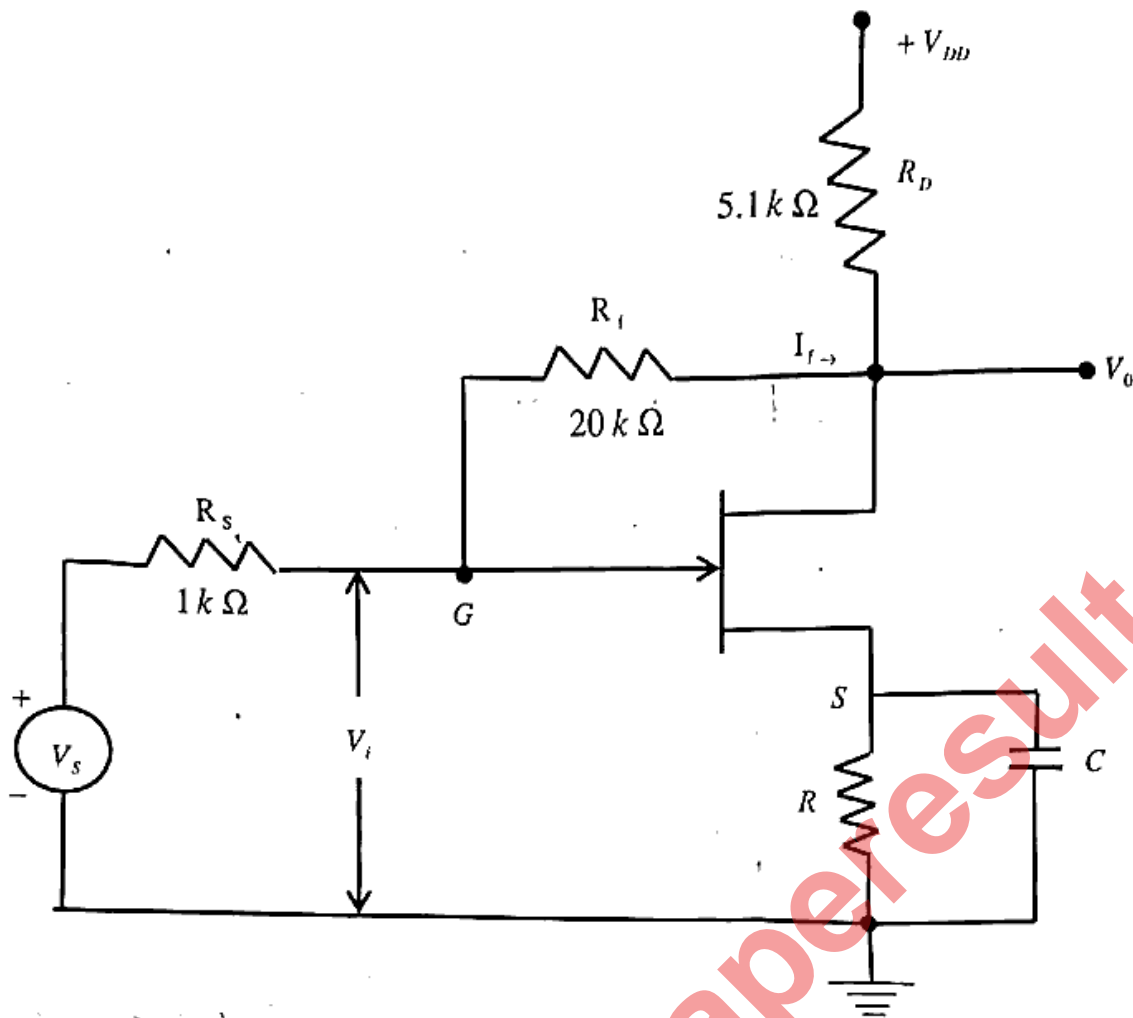
1. NIL _____   2. NIL _____

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, $g_m = 5mA/V$, $R_D = 5.1K\Omega$, $R_s = 1K\Omega$, $R_f = 20K\Omega$, $r_d = 1M\Omega$.   [8]

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 $A_v = 300$, $R_i = 1.5K\Omega$, $R_o = 50K\Omega$ and $\beta = 1/15$. [8]
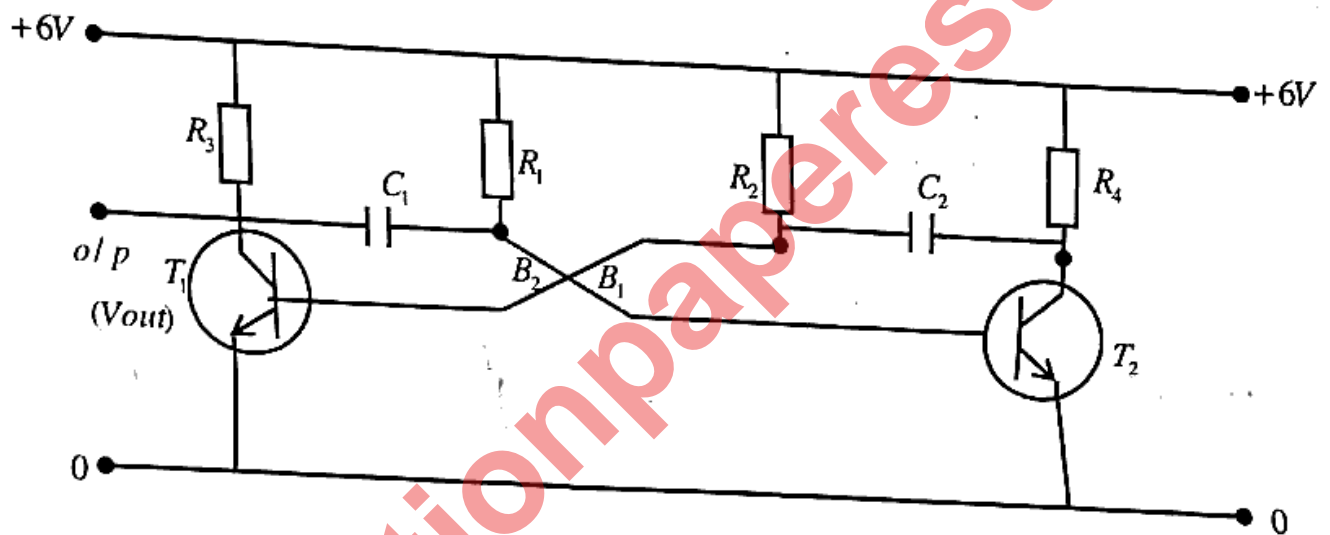
UNIT-II

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]

$L = 100\mu H$, $L_{RFC} = 0.6mH$, $C_2 = 0.001\mu F$, $C_1 = 0.01\mu F$, $C_c = 10\mu F$

Determine –

(i) Operating frequency

(ii) Feedback – fraction

(iii) Minimum gain to sustain oscillations and emitter resistance if $R_C = 2.5 K\Omega$.

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, $R_1 = R_2 = 5 K\Omega$, $R_3 = R_4 = 0.4 K\Omega$ 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]

Q.3 (a) Write a short note on Emitter follower at high frequency and drive expression for high frequency voltage gain. [8]

(b) Given the following transistor measurement at $I_C = 5mA$, $V_{CE} = 10V$, and at room temperature. $h_{fe} = 100$, $h_{ie} = 600ohm$, $A_i = 10$ at $10MH_Z$, $C_C = 3pF$. 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 $R = 50ohms$, $L = 10mH$ and $C = 0.1\mu F$. 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 $V_{CC} = 50V$. The signal swings the collector voltage down to $V_{min} = 5V$. The total dissipation in both transistors is 40W. Find the total power conversion efficiency. [8]