Roll No.

4E4120

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B. Tech. IV-Sem. (Main & Back) Exam; April-May 2017

Electronic Inst. & Control Engg.

4E11A Analog Electronics

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 26

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 materials is permitted during examination. (Mentioned in form No. 205)

1. NIL _____ 2. NIL _____

UNIT - I

1 (a) For a current shunt feedback amplifier, find expression for input resistance and output resistance.

   (b) For the circuit given that $R_C = 4k\Omega$, $R_1 = 40\,k\Omega$, $R_S = 10\,k\Omega$, $h_{ie} = 1.1\,k\Omega$, $h_{fe} = 50$, $h_{re} = h_{oe} = 0$, find : (i) A_{vf} (ii) R_{if} (iii) R_{of}
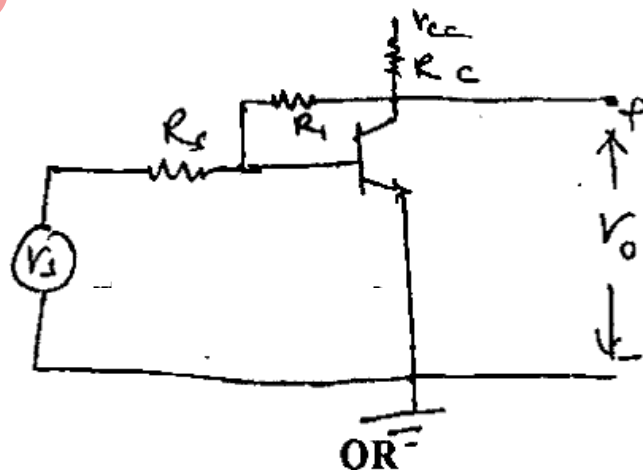

Fig. 1

OR

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[P.T.O.

1. (a) Enumerate the effect of negative feedback amplifiers.

(b) An amplifier has a voltage gain of 40. The amplifier is now modified to provide a 10% negative feedback in series with the input. Determine :

(i) Voltage gain with feed back

(ii) Amount of feedback in dB.

(iii) Loop gain,

UNIT - II

2. (a) Explain a generalised reasonant circuit oscillator (LC oscillator). How is its resonant frequency controlled by external circuit elements ? Under what conditions such an oscillator is called Colpitt oscillator ?

(b) A phase shift oscillator uses three identical RC sections in the feedback network. The value of components are $R = 100\,k\Omega$ and $C = 0.01\,\mu F$. Calculate the frequency of oscillator.

OR

2. (a) Explain the working of a monostable multivibrator with the help of suitable circuit diagram using BJT and also show the waveforms at various points and derive expression for time width.

(b) A Colpitts oscillator is designed with $C_1 = 100\,pF$ and $C_2 = 7500\,pF$. The inductance is variable. Determine the range of inductance values of the frequency if oscillation is varied between 950 kHz to 2050 kHz.

3 (a) Derive the expression for the CE current gain and voltage gain including source resistance R_S.

(b) A transistor's short circuit current gain is measured to be 25 at a frequency of 2 MHz. If $f_B = 200 \, kHz$, calculate :

(i) The current gain bandwidth product.
(ii) h_{fe} at low frequency
(iii) Short circuit current gain at 10 MHz and 100 MHz.

OR

3 (a) Draw the high frequency equivalent circuit of an emitter follower and derive the expression of upper cut-off frequency, f_{II}.

(b) Given the following transistor measurements made at $I_C = 5 \, mA$, $V_{CC} = 10 \, V$ and at room temperature $h_{fe} = 100$, $h_{ie} = 600 \, \Omega$ $A_i = 10$ at frequency

f = 10 mHz $C_c = 3 \, Pf$. Find f_B, f_t, C_c, R_b/e and $r_{bb'}$

UNIT - IV

4 (a) How you can classify tuned amplifiers, discuss in brief with suitable examples.

(b) A tank circuit has a capacitor of 100 pF and an inductor of 150 μH. The series resistance is 15 Ω. Find the impedance, Q and bandwidth of resonant circuit.

OR

[**P.T.O.**

4 (a) An FET having $g_m = 6\, mA/V$ has a tuned load consisting of a 400 µH inductance of $5\,\Omega$ in parallel with a capacitor of 2500 pF. Find.

    (i) Resonant frequency

    (ii) Tuned circuit dynamic resistance

    (iii) Gain at resonance

    (iv) Signal bandwidth

  (b) Explain the working of stagger tuned amplifier with help of frequency response.

UNIT - V

5 (a) Compare the power output, efficiency and rating of devices required for a class-A push pull and class-B push pull stages. Also derive the required expression.

  (b) A power transistor operated in class 'A' operator delivers a maximum of 6W to a $8\,\Omega$ load with the supply voltage of 25 V. The Q point is adjusted for a symmetrical swing. Calculate

    (i) Steps down turns ratio

    (ii) Peak collector current

    (iii) Efficiency

OR

5 (a) Discuss crossover distortion in class-B power amplifier.

  (b) A complimentary symmetry class-B amplifier supplies output to a load of $3\,\Omega$ from the supply voltage of 20 V. Calculate maximum power output, Power dissipation rating of each transistor.