

328453(28)

**B. E. (Fourth Semester) Examination,
April-May 2020**

(New Scheme)

(Elect. & Tele. Engg.)

ANALOG ELECTRONICS

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : Attempt all questions. Part (a) of each unit is compulsory carry 2 marks. Attempt any two parts from (b), (c) and (d) carry 7 marks. Assume suitable data if required.

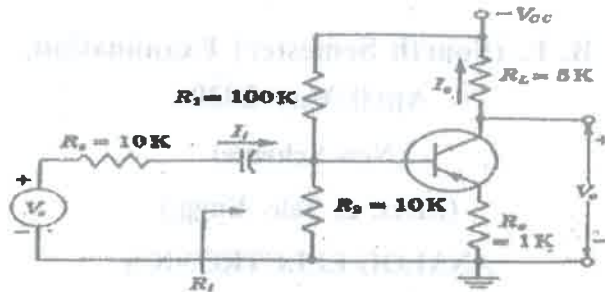
Unit-I

1. (a) Draw a low frequency equivalent circuit for CB transistor? 2
- (b) For the amplifier shown compute $A_1 = \frac{I_o}{I_i}$, A_v , A_{vs}

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and R_i . Given $h_{ie} = 1.1 \text{ kohm}$, $h_{fe} = 50$,

$h_{oe} = 2.5 \times 10^{-4}$, $h_{re} = 25 \mu\text{mho}$.



(c) State and prove millers theorem and its dual. 7

(d) Draw and explain the Darlington emitter follower circuit? Find out the expression for A_1 and R_i . Also give application of the circuit? 7

Unit-II

2. (a) Why h-parameters model is not suitable for high frequency signals? 2

(b) Derive the expression for short circuit current gain as a function of frequency for a common emitter transistor. Also give the relationship between f_B and f_T . 7

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(c) A single stage CE amplifier is measured to have a voltage gain bandwidth f_H of 5 MHz with $R_L = 500 \Omega$. Assume $h_{fe} = 100$, $g_m = 100 \text{ mA/V}$, $r_{bb} = 100 \Omega$, $C_c = 1 \text{ pF}$ and $f_T = 400 \text{ MHz}$. 7

(i) Find the value of the source resistance that will give the required bandwidth.

(ii) With the value of R_s found in part i), find the midband voltage gain V_o/V_s . Hint : Use approximate analysis.

(d) Draw the Hybrid- π model and explain the physical significance of various parameters used in it? 7

Unit-III

3. (a) What is the maximum collector circuit efficiency of transformer coupled class A amplifier. 2

(b) Prove that the bandwidth shrinks in cascading of identical non-interacting stage? 7

(c) It is desired that the voltage gain of a RC coupled amplifier at 60 Hz should not decrease by more than 10% from its midband value. Show that the coupling capacitance C must be at least equal to

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- 5.5/R where $R = R_o' + R_i'$ is expressed in kilohms and C in microfarad. 7
- (d) What do you understand by Class B amplifier? Show that the maximum efficiency of class B operation will not exceed 78.5 percent? 7

Unit-IV

4. (a) What do you understand by negative feedback in Amplifier? 2
- (b) Enumerate the effects of negative Feedback on the various characteristics of the amplifier. 7
- (c) Describe the four topologies of negative Feedback amplifiers? 7
- (d) What is the effect of negative feedback on input impedance of voltage shunt and current shunt amplifier? 7

Unit-V

5. (a) Give the two Barkhausen conditions required in order for sinusoidal oscillations to be sustained? 2

[5]

- (b) Derive an expression for the frequency of Oscillation of phase shift oscillator? 7
- (c) Draw the circuit and explain the working of Hartley oscillator using BJT. Write expression for frequency of oscillation? 7
- (d) What is wein bridge oscillator? Show that for such an oscillator gain of amplifier should be $A > 3$ to produce oscillations. 7