Printed Pages – 4 Roll No. .....

328453(28)

B. E. (Fourth Semester) Examination, April-May 2021

(New Scheme)

(Electronics & Telecommunication Engg. Branch)

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) Which configuration is knows as emitter follower and why?

(b) Draw the hybrid model for all the tree configuration of BJT and give the equations.

(c) A transistor used in CE arrangement has the following set of h parameters when the d.c. operating point is $V_{CE} = 10$ volts and $I_C = 1$ mA : $h_{ie} = 200\ \Omega$; $h_{oe} = 10^{-4}$ mho; $h_{re} = 10^{-3}$; $h_{fe} = 50$.

Determine (i) input impedance (ii) current gain, and (iii) voltage gain.

The a.c. load seen by the transisot if $rL = 600\ \Omega$. What will be approximate values using reasonable approximations?

(d) Draw the h-parameter equivalent circuit for a generalize transistorized amplifier and derive the expression only for A_i, A_v and R_i.

Unit-II

2. (a) What is $r_{b'b}$? How does its respond to temperature?

(b) Prove that :

(i) $h_{fe} = g_m r_{b'e}$

(ii) $h_{ie} = r_{b'b} + r_{b'e}$

(iii) $r_{b'c} = \dfrac{r_{b'e}}{h_{re}}$

(c) The following transistor measurements are made at = 5 mA, $V_{CE} = 10$ V at room temperature, $h_{fe} = 100$, $h_{ie} = 600\ \Omega$.

$|A_{ie}| = 10$ at 10 MHz, $C_c = 3$ pF

Find F_β, F_T, C_e, $r_{b'e}$, $r_{bb'}$.

(d) Derive the equation for g_m, which give the relation between g_m, I_c and temperature.

Unit-III

3. (a) Define rise time of an amplifier. How it is related with upper 3 dB frequency of the amplifier?

(b) Prove that the bandwidth shrinks in cascading of identical non-interacting stages.

(c) It is desired that the voltage gain of the 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 $5{\cdot}5\ /R'$, where $R' = R'_0 + R'_1$ and is expressed in kiloohms and C in microfarads.

(d) Show that the maximum conversion efficiency of the idealized class B push-pull amplifier circuit is 78·5%.

Unit-IV

4. (a) What do you mean by negative feedback?

   (b) Give step procedure for identifying topology of feedback in amplifiers.

   (c) Derive the derivation of input resistance and output resistance of voltage shunt feedback amplifier.

   (d) Discuss the consequences of introducing negative feedback in small signal amplifier.

Unit-V

5. (a) What is the Barkhausen criterion for the feedback oscillators?

   (b) Explain the operational characteristics of RC phase shift oscillator and prove that $h_{fe\ \min} = 44{\cdot}5$.

   (c) Draw the circuit of Wein bridge oscillator and explain its working principle. Derive the expression for frequency of oscillations.

   (d) Draw the circuit of Colpitts oscillator. How are the feedback requirements met in it? Derive the expression for frequency of oscillations.