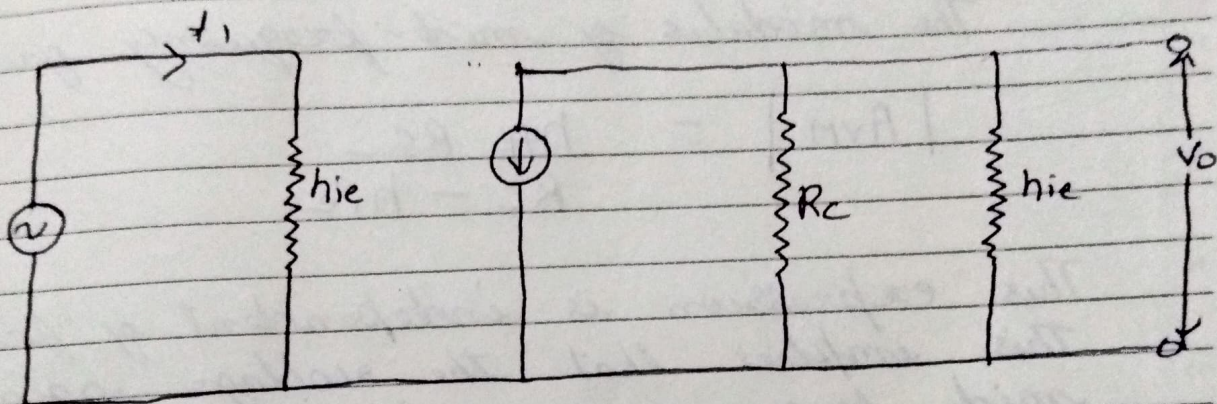


i) Mid Frequency Range \rightarrow

At mid frequencies the impedance offered by coupling capacitor is so small that it acts as a short while the impedance of shunting capacitor is so large that it acts as open and hence both may omitted from the circuit. Therefore the simplified equivalent circuit at mid frequency range is given in fig.



The output impedance Z is given by

$$\frac{1}{Z} = \frac{1}{R_c} + \frac{1}{h_{ie}} \quad \text{i.e.} \quad Z = \frac{R_c h_{ie}}{R_c + h_{ie}}$$

The r.m.s value of input voltage $V_o = -h_{fe} i_1 Z$

The r.m.s value of input voltage is

$$V_i = i_1 h_{ie}$$

The voltage gain at mid frequency range is

MARCH 2010					APRIL				
1	8	15	22	29	Mon	5	12	19	26
2	9	16	23	30	Tue	6	13	20	27
3	10	17	24	31	Wed	7	14	21	28
4	11	18	25		Thu	1	8	15	22
5	12	19	26		Fri	2	9	16	23
6	13	20	27		Sat	3	10	17	24
7	14	21	28		Sun	4	11	18	25

$$A_{vm} = \frac{V_o}{V_i} = - \frac{h_{ie} i_1 Z}{i_1 h_{ie}} = - \frac{h_{fe} Z}{h_{ie}}$$

$$= - \frac{h_{fe} RC h_{ie}}{h_{ie} (RC + h_{ie})}$$

The negative sign shows that phase shift of output signal relative to input is 180°

\therefore The modulus of mid-frequency gain is

$$|A_{vm}| = \frac{h_{fe} RC}{RC + h_{ie}}$$

This expression is independent of frequency. This implies that the voltage gain in mid frequency range is independent of frequency.

(ii) Low Frequency Range \rightarrow

At low frequency the series reactance ($1/\omega C$) of the coupling capacitor C is appreciable and varies with frequency, while the shunt reactance $\frac{1}{\omega C_{eff}}$

is large and hence in parallel it acts as an open. Accordingly the equivalent circuit at low frequency range simplifies to fig.

The r.m.s value of input voltage

$$V_{ie} = h_{ie} i_1$$

2010		JANUARY				2010		FEBRUARY		
Mon	4	11	18	25	Mon	1	8	15	22	
Tue	5	12	19	26	Tue	2	9	16	23	
Wed	6	13	20	27	Wed	3	10	17	24	
Thu	7	14	21	28	Thu	4	11	18	25	
Fri	1	8	15	22	29	Fri	5	12	19	26
Sat	2	9	16	23	30	Sat	6	13	20	27
Sun	3	10	17	24	31	Sun	7	14	21	28