

Question No

IC7 = IQ (mA)	0.25	0.25	0.25	0.25	0.20
IC8 (mA)	1.2	1.2	1	1.1	1.1
R4 (kΩ)	12	12	12	10	11
R3 (kΩ)	0.2	0.2	0.2	0.2	0.2
β	120	120	120	110	110
VA7 = VA11 (V)	110	110	120	110	120
V+ (V)	10	11	9	9	11
V- (V)	-10	-11	-9	-9	-11
VBE = VEB (V)	0.7	0.7	0.7	0.7	0.7
VT (V)	0.026	0.026	0.026	0.026	0.026
R2 = R3 (kΩ) {IC7 = IQ}	0.2	0.2	0.2	0.2	0.2
I1=IQ exp[IQ R2/VT] (mA)	1.7105	1.7105	1.7105	1.7105	0.9315
R1=(V+ - VBE - V-)/I1 (kΩ)	11.2833	12.4525	10.1140	10.1140	22.8667
IC2 = IC4 = IQ/2 (mA)	0.125	0.125	0.125	0.125	0.1
Assume VA2 = VA4 = VA7 {not given}	110	110	120	110	120
Av1 = gm2 (ro2 ro4 Ri)	1846.3886	1846.3886	1991.2233	1803.0124	1940.8679
gm2 = IC2 / VT (mA/V)	4.8077	4.8077	4.8077	4.8077	3.8462
ro2 = VA2 / IC2 (kΩ)	880	880	960	880	1200
ro4 = VA4 / IC4 (kΩ)	880	880	960	880	1200
RoDA = ro2 ro4 (kΩ)	440	440	480	440	600
RoDA Ri = (ro2 ro4 Ri) (kΩ)	384.0488	384.0488	414.1744	375.0266	504.6257
Ri = rπ6 + rπ7 (1 + β)	3020.16	3020.16	3020.16	2539.68	3174.6
rπ6 = [(1+β) β VT] / IQ (kΩ)	1510.08	1510.08	1510.08	1269.84	1587.3
rπ7 = (β VT) / IQ (kΩ)	12.48	12.48	12.48	11.44	14.3
Ri = [2 (1+β) β VT] / IQ (kΩ)	3020.16	3020.16	3020.16	2539.68	3174.6
Av2 = (IQ / 2 VT) RL7	3263.5702	3263.5702	3415.9584	2852.8962	2599.8751
RL7 = Rc11 Rb8 (kΩ)	678.8226	678.8226	710.5194	593.4024	675.9675
Rc11 = ro11 [1 + gm11 (rπ11 R3)]	1272.8076	1272.8076	1388.5174	1271.6151	1510.3448
gm11 = IC7 / VT (mA/V)	9.6154	9.6154	9.6154	9.6154	7.6923
ro11 = VA11 / IC7 (kΩ)	440	440	480	440	600
rπ11 = (β VT) / IC7 (kΩ)	12.48	12.48	12.48	11.44	14.3
rπ11 R3 (kΩ)	0.1968	0.1968	0.1968	0.1966	0.1972
Rb8 = rπ8+(1+β)R4 (kΩ)	1454.6	1454.6	1455.12	1112.6	1223.6
rπ8 = (β VT) / IC8 (kΩ)	2.6	2.6	3.12	2.6	2.6
Av3	1	1	1	1	1
Av = Av1 x Av2 x Av3	6025818.80	6025818.80	6801935.86	5143807.18	5046014.17
Ro = R4 (rπ8 + Z)/(1+β) (kΩ)	2.2199	2.2199	2.3831	2.2889	2.8748
(rπ8 + Z)/(1+β) (kΩ)	2.7237	2.7237	2.9737	2.9684	3.8920
Z = Rc11 Rc7 (kΩ)	326.9692	326.9692	356.6937	326.8905	429.4118
Rc7 = ro7 = VA7 / IC7 (kΩ)	440	440	480	440	600