Biomed/Rev/IV 2-30—5-30
3/12/14
Electronic Circuits & Design QP Code :12482
(18)

(3 Hours) [Total Marks : 80

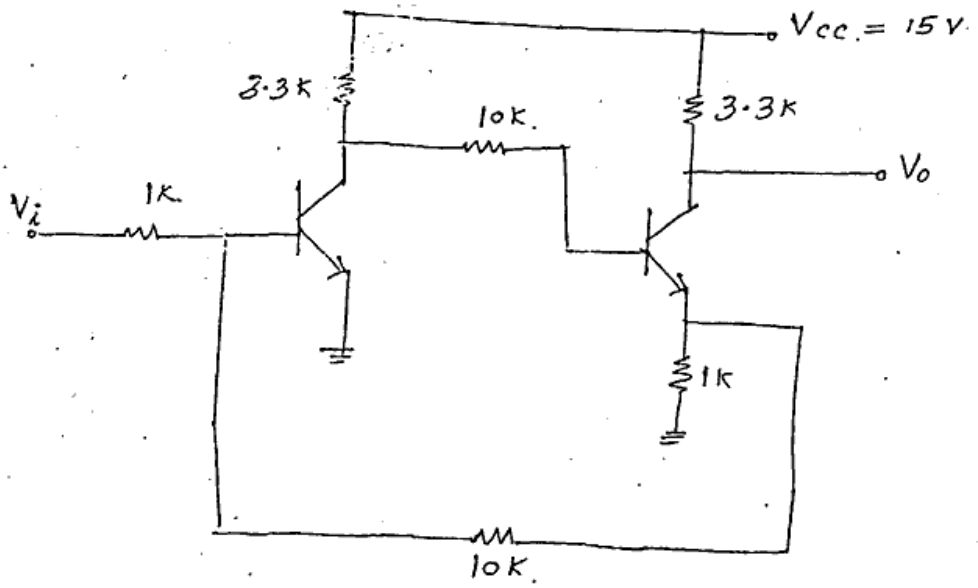
N.B. : (1) Question no. 1 is **compulsory.**
(2) Attempt any **three** questions out of remaining **five** questions.

1. (a) Explain CMRR and slew rate. Also give its practical values for IC 741. 5
(b) State and prove conditions for sustained oscillations. 5
(c) Compare Class A and Class B power amplifier. 5
(d) Explain current mirror circuit used in differential amplifier. 5

2. (a) With neat circuit diagram and waveforms explain class B power amplifier. Also derive maximum efficiency for the same. 10
(b) Design class A transformer coupled amplifier to provides 10 w power to the speaker of 10 Ω rating. 10

3. (a) Write features of instrumentation amplifier. Derive relation of gain of 3 op-amp instrumentation amplifier. 10
(b) Derive relation of frequency of oscillations and condition of sustained oscillations for Hartley oscillator. 10

4. (a) Explain the advantages of negative feedback and compare all four types of feedback. 10
(b) For the circuit shown in figure below, determine A_{vf}, R_{if} and R_{of} 10
Given hie =1k, hfe = 100.
specify the types of feedback.



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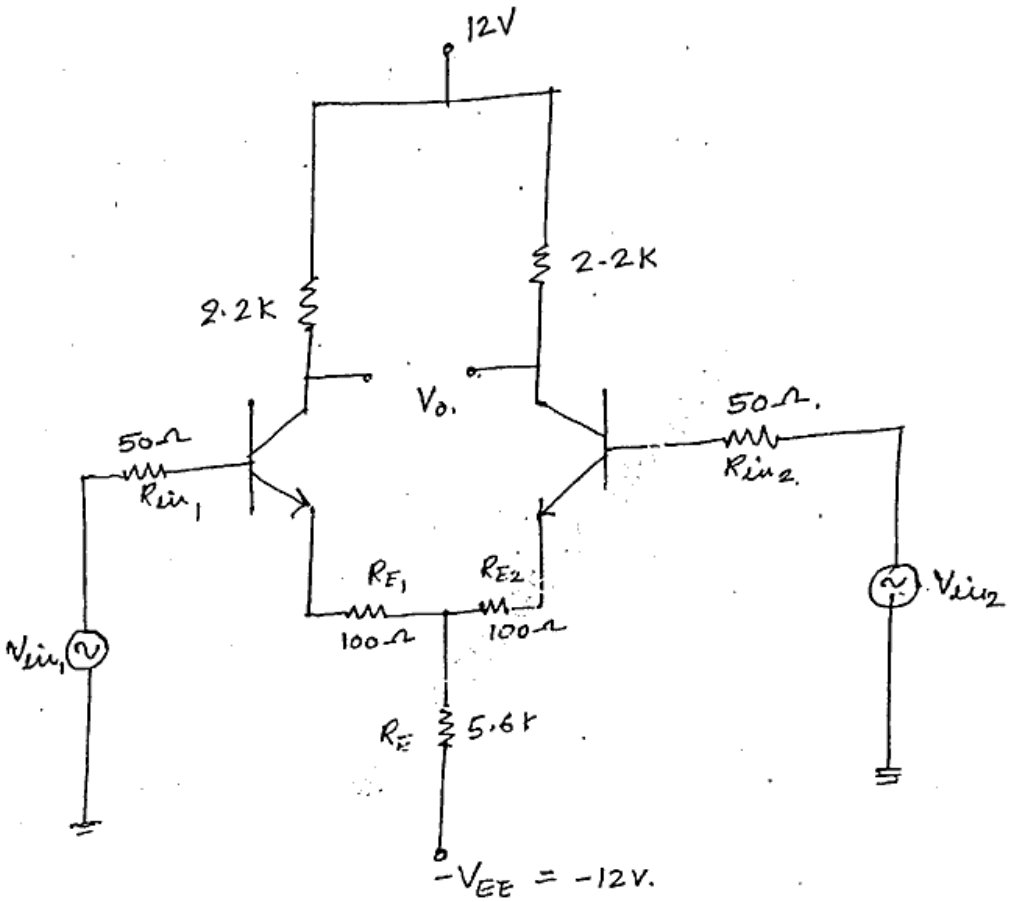
5. (a) Analyse the given differential amplifier circuit and derive expressions for I_{CQ}, V_{CEQ}, CMRR for the circuit shown in figure. 20
   (i) Calculate ICQ, VCEQ,
   (ii) Also calculate o/p voltage if V_{in} =60m V_{ims}, and V_{in2} = 40mV_{ims}.
   (iii) Peak to peak o/p voltage, i/p resistance and o/p resistance.



6. Write short notes on following (any two) :— 20
   (a) Precision rectifier
   (b) Log and antilog amplifier
   (c) V to I and I to V circuit
   (d) Schmitt trigger.

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DATA SHEET

Transistor type	Pdmax @ 25°C Watts	Icmax @ 25°C Amps	$V_{CE}^{(sat)}$ volts d.c.	V_{CEO} volts d.c.	V_{CEO} (Sus) volts d.c.	V_{CER} (Sus) volts d.c.	V_{CEX} volts d.c.	V_{EBO} volts d.c.	T_j max °C	D.C. current gain min	D.C. current gain typ.	D.C. current gain max.	Small Signal h_{fe} min.	Small Signal h_{fe} typ.	Small Signal h_{fe} max.	V_{BE} max.	θ_{jc} °C/W	Derate above 25°C W/°C
2N 3055	115·5	15·0	1·1	100	60	70	90	7	200	20	50	70	15	50	120	1·8	1·5	0·7
ECN 055	50·0	5·0	1·0	60	50	55	60	5	200	25	50	100	25	75	125	1·5	3·5	0·4
ECN 149	30·0	4·0	1·0	50	40	—	—	8	150	30	50	110	33	60	115	1·2	4·0	0·3
ECN 100	5·0	0·7	0·6	70	60	65	—	6	200	50	90	280	50	90	280	0·9	35	0·05
BC147A	0·25	0·1	0·25	50	45	50	—	6	125	115	180	220	125	220	260	0·9	—	—
2N 525(PNP)	0·225	0·5	0·25	85	30	—	—	—	100	35	—	65	—	45	—	—	—	—
BC147B	0·25	0·1	0·25	50	45	50	—	6	125	200	290	450	240	330	500	0·9	—	—

Transistor type	hie	hoe	hre	θja
BC 147A	2·7 K Ω	18μ ℧	$1·5 \times 10^{-4}$	0·4°C/mw
2N 525 (PNP)	1·4 K Ω	25μ ℧	$3·2 \times 10^{-4}$	--
BC 147B	4·5 K Ω	30μ ℧	2×10^{-4}	0·4°C/mw
ECN 100	50 Ω	—	—	—
ECN 149	15 Ω	—	—	—
ECN 055	12 Ω	—	—	—
2N 3055	6 Ω	—	—	—

BFW 11—JFET MUTUAL CHARACTERISTICS

$-V_{GS}$ volts	0·0	0·2	0·4	0·6	0·8	1·0	1·2	1·6	2·0	2·4	2·5	3·0	3·5	4·0
I_{DS} max. mA	10	9·0	8·3	7·6	6·8	6·1	5·4	4·2	3·1	2·2	2·0	1·1	0·5	0·0
I_{DS} typ. mA	7·0	6·0	5·4	4·6	4·0	3·3	2·7	1·7	0·8	0·2	0·0	0·0	0·0	0·0
I_{DS} min. mA	4·0	3·0	2·2	1·6	1·0	0·5	0·0	0·0	0·0	0·0	0·0	0·0	0·0	0·0

N-Channel JFET

Type	V_{DS} max. Volts	V_{DG} max. Volts	V_{GS} max. Volts	P_d max. @25°C	T_j max.	I_{DSS}	g_{mo} (typical)	$-V_p$ Volts	r_d	Derate above 25°C	θ_{ja}
2N3822	50	50	50	300 mW	175°C	2 mA	3000 μ℧	6	50 KΩ	2 mW/°C	0·59°C/mW
BFW 11 (typical)	30	30	30	300 mW	200°C	7 mA	5600 μ℧	2·5	50 KΩ	——	0·59° C/mW

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