1T00314 - S.E.(BIOMEDICAL)(Sem IV) (CBSGS) / 38503 - ELECTRONIC CIRCUITS & DESIGN -II

Q.P. Code :25352

[Time: 3 Hours] **[Marks:80]**

Please check whether you have got the right question paper.

N.B: 1. Question no one is compulsory.
2. Attempt any three questions out of remaining five questions.
3. All questions carry equal marks.

Q.1 Answer the following questions

a) State and derive Barkhausen's criterion for oscillators. 5

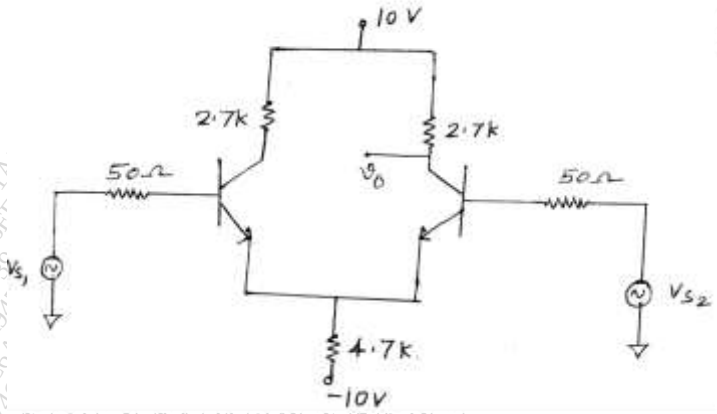
b) Design Hartley oscillator for frequency of oscillations 5KHz 5

c) With neat diagram and waveforms explain zero crossing detector. 5

d) Differentiate class A and B power amplifier. 5

Q.2 a) With neat circuit diagram explain working of Wein Bridge Oscillator. Derive relation of frequency of oscillation for the same. 10

b) 10



Following specification are given for DIUO differential amplifier βdc= βac = 100, V_{BE} =0.7v. Determine I_{CQ} and V_{CEQ} values , voltage gain A_d, Ac, CMRR, i/p and o/p resistances.

Q.3 a) With neat block diagram, differentiate all the types of negative feedback amplifiers 10

b) Design transformer coupled class A power amplifier for the following specification. 10
A.C. Power to load P_L =3w, R_L = 15w

Q.4 a) With neat diagram, derive voltage gain relation of 3 op-amp instrumentation amplifier. 10
State the features.
Also write an application.

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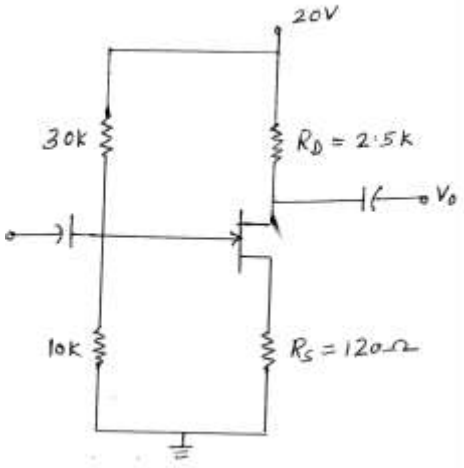
b) For the circuit shown below, identify the feedback topology and calculate the values of D, G_{Mf}, Av_f, Ri_f, Ro_f if FET parameters are g_m= 2mA/V, rd=25k 10



Q.5 a) List methods to increase CMRR of differential amplifier. Explain. 10

b) With neat diagram, explain working of Schmitt trigger. Design the circuit if Vth $\pm$ = 8v 5

c) Design adder circuit for the equation $v_o = -2\,v_a - 6v_b - 8v_c$ using op-amp 5

Q.6 Write short notes on (Any Two) 20

a) Log and antilog amplifier

b) Astable Multivibrator

c) Heat sink used in power amplifier.

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DBEC 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_{CES} (Sus) volts d.c.	V_{CEX} volts d.c.	V_{EBO} volts d.c.	T_j max °C	D.C. current gain min	typ.	max.	Small Signal h_{fe} min.	typ.	max.	V_{BE} max.
2N3055	115·5	15·0	1·1	100	60	70	90	7	200	20	50	70	15	50	120	1·8
ECN055	50·0	5·0	1·0	60	50	55	60	5	200	25	50	100	25	75	125	1·5
ECN149	30·0	4·0	1·0	50	40	—	—	8	150	30	50	110	33	60	115	1·2
ECN100	5·0	0·7	0·6	70	60	65	—	6	200	50	90	280	50	90	280	0·9
BC147A	0·25	0·1	0·25	50	45	50	—	6	125	115	180	220	125	220	260	0·9
2N525(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	oja
BC 147A	2·7 K Ω	18μ ℧	1·5 × 10^{-4}	0·4°C/mw
2N 525 (PNP)	1·4 K Ω	25μ ℧	3·2 × 10^{-4}	—
BC 147B	4·5 K Ω	30μ ℧	2 × 10^{-4}	0·4°C/mw

BFW 11—JFET MUTUAL CHARACTERISTICS

–Vgs 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
Ios 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
Ios 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
Ios 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

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}	R_{DS} max	$-V_p$ Volts	r_d	Derate above 25°C
2N3822	50	50	50	300 mW	175°C	2 mA	3000 μΩ	6	50 KΩ	2 mW/°C
BFW 11 (typical)	30	30	30	300 mW	200°C	7 mA	5000 μΩ	2·5	50 KΩ	——

UJT type	P_d max. @25°C	I_g max. @25°C	I_p peak pulse current max.	V_{B2E} Volts max.	V_{B2B} Volts	T_j max	η min.	η max.	R_{B2} KΩ min.	R_{B2} KΩ typ.	R_{B2} KΩ Max.	I_p max.	I_p μA
2N2646	300mW	50mA	2Amp.	30	35	125°C	0·56	0·75	4·7	7·0	9·1		5·0