## Q.P. Code :25351

[ Marks:80]

1. Question no one is compulsory. N.B: 2. Attempt any three questions out of remaining five questions. 3. All questions carry equal marks. Q.1 a) Discuss LOG amplifier using op-amp with neat circuit diagram. Derive expression for 5 output and state disadvantages. 5 b) Compare current series and current shunt types of negative feedback. c) Explain working of precision full wave rectifier using op-amp. d) For power BJT the thermal resistance parameters are as follows. 5  $\theta_{\text{dev-case}} = 3 \, {}^{0}\text{c/w}$  $\theta_{\text{case-sink}} = 0.7 \, ^{\circ}\text{c/w}$  $\theta_{\text{case-amb}} = 72 \, {}^{0}\text{c/w}$  $T_{amb} = 40^0 c$  $T_{i \text{ max}} = 180^{0} \text{ c}$  $\theta_{\text{sink-amb}}$  5  $^{0}\text{c/w}$ Evaluate the maximum power dissipation in transistor with and without heat sink. Q.2 a) Derive the equations for frequency of oscillations and conditions for colpitt's oscillator 10 with neat circuit diagram. Discuss its disadvantage and method to overcome it. b) Design transformer coupled class A power amplifier to provide 9 W output to  $6\Omega$  load. 10 Q.3 a) Derive equation for gain of three op-amp instrumentation amplifier and design it for 10 variable gain from 1 to 1000. b) Evaluate A<sub>d.</sub> Ac and CMRR for DIUO differential amplifier 10 Given = supply =  $\pm$  20V , Rc= 4.7 k  $\Omega$  $R_E = 1.5 \text{ k} \Omega$  ,  $R_{S} = 750 \Omega$  ,  $\beta = 150$ Discuss need of swamping resistors. 7 Q.4 a) Discuss shortcomings of ideal integrator and suggest solution for the same in detail. Draw frequency response for both the cases and develop output equation. b) Evaluate Av<sub>f</sub> and Rinf for the following circuit. 13

[Time: 3 Hours]

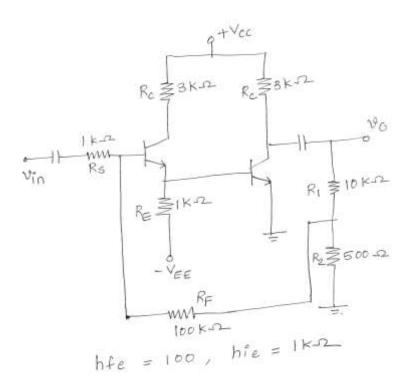
Please check whether you have got the right question paper.

## Q.P. Code:25351

5

5

20



- Q.5 a) Discuss class- B push- pull power amplifier with neat diagram and current wave froms 10 Derive equations for efficiency and figures of merit. Explain advantages and disadvantages.
  - b) Design R.C phase shift oscillator for f= 10KHz.
  - c) Explain working of clamper circuit using op-amp. Draw input output wave from.
- Q.6 Write short notes on (any four)
  - a) Characteristics of negative feedback
  - b) Class AB push. Pull power amplifier
  - c) Current mirror circuit
  - d) Peak detector
  - e) Schmitt trigger.

\*\*\*\*\*\*\*

DBEC DATA SHEET

115-5   15-0   1-1   100   60   70   90   7   200   20   50   10   15   15   15   1-1   100   60   50   50   50   50   20   20   20   2	Transistor type	Pdmax @ 25°C	C @ 25°C	V Co	VCSO	V C20	V Caus)	VCER	Vate	7.	D.C.	CHFFERE	ıt gain		Small	Signal	A.	V ax
115-5   15-0   1-1   100   60   70   90   7   200   25   50   100   25   30   30   30   30   30   30   30   3		Walls			d.c.	volts d.c.	olts d.c.	d.c.	ø.c.	2.	min	typ.	MLG		mia.	typ.	max.	
Store	2N3055	115-5	15-0	:	100	9	70	06	7	200	20	80	1		31	So	120	
30.0 4-0 1-0 50 40 - 8 150 30 50 110 33 54 67 0-6 70 60 65 - 6 200 50 50 110 33 0.225 6-23 85 30 - 6 100 35 180 220 0.225 0-1 0-25 50 45 50 - 6 125 200 290 450 240  Polity Note: 0ja	ECM055	20-0	5.0	0-1	60	20	55	09		200	36	9	101		35	7.	361	
1,000   1,00	ECN149	30-0	4-0	1.0	50	40	1	1	. 00	150	2 5	2 6	-		11	2 5	114	
0.25	ECN100	5-0	0.7	9-0	70	09	65	. 1	9	200	50	000	200		200	86	280	0.0
0.225	BC147A	0.25	÷	0.25	20	4 5	20	ţ	9	125	115	180	22		25	220	260	0.0
199e hie hoe hre oja 8FW 11—1FET MUTUAL CHARACTERISTICS  2.7 K.D. 18µ U 1.5 x 10 <sup>4</sup> 0.4°C/mw 10s max. mA 10 9.0 8.3 7.6 6.8 6.1 5.4 4.2  4.5 K.D. 30µ U 2 x 10 <sup>4</sup> 0.4°C/mw 10s max. mA 10 9.0 8.3 7.6 6.8 6.1 5.4 4.2  4.5 K.D. 30µ U 2 x 10 <sup>4</sup> 0.4°C/mw 10s max. mA 10 9.0 8.3 7.6 6.8 6.1 5.4 4.2  10s min. mA 4.0 5.0 5.4 1.6 1.0 0.5 0.0 0.0  11.7 FET  12.7 K.D. 18µ U 1.5 x 10 <sup>4</sup> 0.4°C/mw 10s min. mA 10 9.0 8.3 7.6 6.8 6.1 5.4 4.2  12.8 Max. Voe max. V <sub>21</sub> max. V <sub>21</sub> max. V <sub>21</sub> max. T <sub>1</sub> max. T <sub>1</sub> max. T <sub>1</sub> max. T <sub>2</sub> max. T <sub>1</sub> max. T <sub>2</sub> max. T <sub>3</sub> max. T <sub>4</sub> max. min. max. min. max. min. T <sub>4</sub>	2N525(PNP )	0.225	9.5	6-25	80 50	30	1	ŀ	1	100	35	1	9		1	45	1	ı
19pe   hie hoe hre oja   8fW   11ifET MUTUAL CHARACTERISTICS   1-6   1-2   1-2   1-6   1-2   1-6   1-2   1-6   1-2   1-6   1-2   1-6   1-2   1-2   1-6   1-2	801418	0.25	0-1	0.25	20	4.5	20	1	9	125	200	290	45	-5.01(1)	140	330	200	6.0
2-7 K ft 18 µ t5 1.5 x 10 <sup>-4</sup> 0.4°C/mw los typ, mA 10 9-0 8-3 7-6 6-8 6-1 5-4 4-2 10-4 K ft 25 µ t5 x 10 <sup>-4</sup> 0.4°C/mw los typ, mA 10 9-0 8-3 7-6 6-8 6-1 5-4 4-2 10-4 5-4 ft 25 µ t5 x 10 <sup>-4</sup> 10-4 c/mw los typ, mA 10 6-0 6-8 1-6 1-6 1-0 1-0 1-0 1-0 1-0 1-0 1-0 1-0 1-0 1-0	Transistor type	hie	hoe	hre		oja	BFW.	11-JFE	T MUTU	AL CHA	RACTEA	USTICS						
el JFET  el JFET  voir max. Vos max. Volts Gass Current max. Volts max. max. T <sub>i</sub> max. Volts Gass Current max. Volts Gass Current max. Volts max. Main. max. min. Not max. min. Min. Max. Min. Max. min. Min. Min. Min. Min. Min. Min. Min. M	BC 147A	2.7 K D	184 75	1.5 x		1.4°C/mw	-VGs	volts	0.0	-	-		_	-	3.6	2.0	2-4 2	2.5 3.0
el JFET  el JFET  los min. mA  1.0 6.0 5.4 4.6 4.0 3.3 2.7 1.7  los min. mA  1.0 6.0 5.4 4.6 4.0 0.0 0.0  105 min. mA  105 min. mA  106 min. mA  107 1.0 6.0 5.4 4.6 4.0 0.0  107 1.0 0.5 0.0 0.0  108 min. mA  109 min. mA  109 min. mA  109 min. mA  109 min. min. min. min. min. min. min. min.	2N S2S (PNP)	14 K D	25µ U	3-2 ×		1	Ins ma	Am Y	10	0-6	-	-	-	+	4.2	=	2.2 2.2	2.0 1.1
el JFET  vos max. Vos max. Vos max. P <sub>e</sub> max. T <sub>f</sub> viax. I <sub>oss</sub> R <sub>ess</sub> -V <sub>f</sub> Volts  So So So 300 mW 175°C 2 mA 3000 µΩ 6  sypical) 30 30 30 mW 200°C 7 mA 5000 µΩ 6  sypical) 30 30 30 mW 200°C 7 mA 5000 µΩ 6  P <sub>e</sub> max. I <sub>e</sub> max.  P <sub>e</sub> max. I <sub>e</sub> max.  I <sub>f</sub> Vost vise current max. Volts max. Volts max. min. 179.  300mW 50mA 2Amo 35 30 35 35 125°C 0.56 0.75 4.7 7.0	BC 147B	4.5 K D	304 23	73 X		)-4°C/mw	dos typ	Y my	7.0	0.9	-	-	-	-	1.7	8-0	-	0-0 0-0
el JFET  Vol max. Voc max. Vol max. P, max. T, max. loss &							los mi	n. mA	4.0	3.0	-	_	-	-	0.0	0.0	0.0	0-0 0-0
Post max.         Volts         P <sub>c</sub> max.         P <sub>c</sub> max.         I max. <t< td=""><td>N-Channel JFE</td><td>75</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	N-Channel JFE	75																
1 200 μΩ 200°C 2 mA 3000 μΩ 6 5.5 300 mW 175°C 2 mA 3000 μΩ 6 2.5 2.5 300 mW 200°C 7 mA 5000 μΩ 2.5 2.5 300 mW 200°C 7 mA 5000 μΩ 2.5 3.5 300 mW 50mA 1, η η η η η η η η η η η η η η η η η η	Type		Votes max.			Vas max. Volts	P, max.	T,	BIAX.	1,011		7		-V, Ve	sites	2"	G	Derate above 25°C
P <sub>s</sub> max. I <sub>g</sub> max.   I <sub>g</sub>   V <sub>est</sub>   V <sub>est</sub>	2N3822		90	50		50	300 mW	17	S°C			OU 100		9		50 KD	2 11	2 mW/C
P. max. Ie max.  [2.1. Max. In max. In Note max. Volts max. Volts max. With Timax min. max. min. 179.  300mW 50mA 2Amo. 30 35 1250 0.56 0.75 4.7 7.0	BFW 11 (typical)		30	30		30	300 mW	20	0.0			OH 00		2.5		50 KG		1
P. max. Is max. Is Reg Garant Control of the Max. Volts max. Volts max. Volts max. Volts max. Win. 199. 300mW 50mA 2Amo. 30 35 125°C 0.56 0.75 4.7 7.0			*															
300mW 50mA 2Amo 30 35 156°C 0.56 0.75 4.7	UiT type	P, max. @25°C	/ <sub>e</sub> max. @25°C	peak pul	I, te curre		Velts max.	2.2	esa; gits	T, max		F	•	NG.		Max.	. I,	E
7.5 7.5 7.5 7.5	2N2646	300mW	50mA		2Amp.		30		35	125°C	0.56	0.75			0	9.1		5.0