Q.P. Code :25351

[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 a) Discuss LOG amplifier using op-amp with neat circuit diagram. Derive expression for output and state disadvantages. 5

b) Compare current series and current shunt types of negative feedback. 5

c) Explain working of precision full wave rectifier using op-amp. 5

d) For power BJT the thermal resistance parameters are as follows. 5

$\theta_{dev\text{-}case} = 3\ ^0c/w$ $\theta_{case\text{-}sink} = 0.7\ ^0c/w$

$\theta_{case-amb} = 72\ ^0c/w$ $T_{amb} = 40^0\ c$

$\theta_{sink-amb}\ 5\ ^0c/w$ $T_{j\ max} = 180^0\ c$

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 with neat circuit diagram. 10
Discuss its disadvantage and method to overcome it.

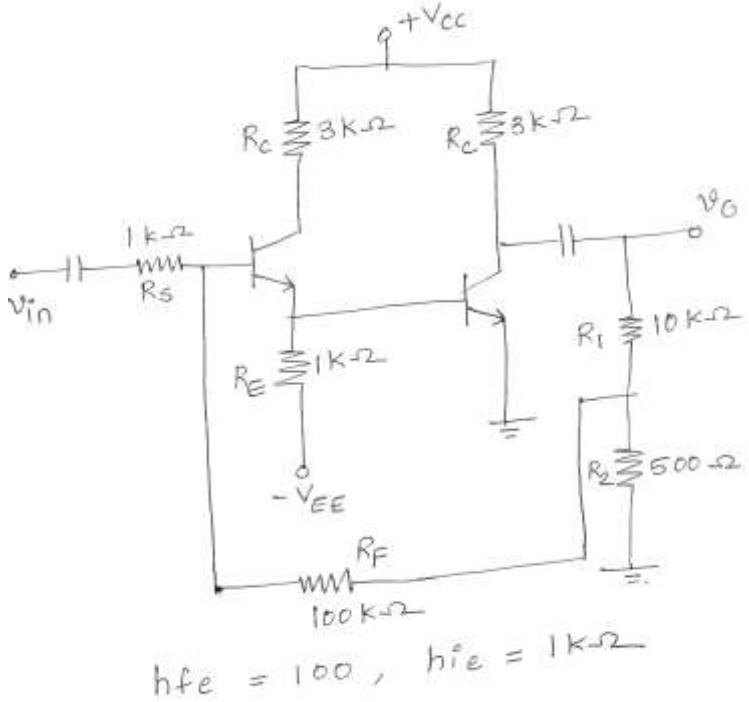
b) Design transformer coupled class A power amplifier to provide 9 W output to 6Ω load. 10

Q.3 a) Derive equation for gain of three op-amp instrumentation amplifier and design it for variable gain from 1 to 1000. 10

b) Evaluate A_d ,Ac and CMRR for DIUO differential amplifier 10
Given = supply = $\pm$ 20V , Rc= 4.7 k Ω
R_E = 1.5 k Ω , R_S = 750 Ω , β = 150
Discuss need of swamping resistors.

Q.4 a) Discuss shortcomings of ideal integrator and suggest solution for the same in detail. 7
Draw frequency response for both the cases and develop output equation.

b) Evaluate Av_f and Rinf for the following circuit. 13



Q.5 a) Discuss class- B push- pull power amplifier with neat diagram and current wave froms Derive equations for efficiency and figures of merit. Explain advantages and disadvantages. 10

b) Design R.C phase shift oscillator for f= 10KHz. 5

c) Explain working of clamper circuit using op-amp. Draw input output wave from. 5

Q.6 Write short notes on (any four) 20

a) Characteristics of negative feedback
b) Class AB push. Pull power amplifier
c) Current mirror circuit
d) Peak detector
e) Schmitt trigger.

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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 min.	typ.	h_{fe} 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_{on}	$-V_p$ 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_{BB} KΩ min.	R_{BB} KΩ typ.	R_{BB} KΩ Max.	I_p max. μA
2N2646	300mW	50mA	2Amp.	30	35	125°C	0·56	0·75	4·7	7·0	9·1	5·0