Q.P. Code : 544902

(3 Hours) **[Total Marks : 100**

N.B. : (1) Question No.**1** and **2** is compulsory.
(2) Answer any **three** from remaining questions.
(3) **Figures** to the **right** indicate **full** marks.
(4) Assume suitable **data** if **required**.

1. (a) Design a two stage R-C coupled BC547 amplifier for the following parameters: Av ≥ 900, VO = 3V $F_L \leq$ 15Hz. **15**
   (b) For the above designed amplifier determine Vo (max), Vi (min) and Rin **5**

2. (a) Design large signal class A transformer coupled power amplifier to provide 8W to 5 Ω load **15**
   (b) For designed circuit find efficiency at full load. **5**

3. (a) For the feedback amplifier shown in figure identify type of feedback and calculate Avf, Rif and Rof. hfe = 60, hie= 1.2KΩ, hre = hoe = 0. (V_{CC}= 12V, Rc = 3 KΩ, Rf = 50 KΩ) **12**

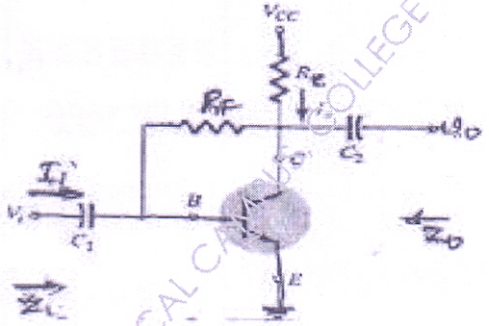

fig-1.

   (b) Explain working of transistorised Schmitt trigger circuit with appropriate waveforms. **8**

4. (a) Derive the expression for frequency of oscillation and gain of Wein Bridge oscillator. **10**
   (b) Design RC phase shift oscillator using JFET BFW 11 for frequency of oscillation 2 KHz. **10**

5. (a) Explain with block diagram different topologies of negative Feedback amplifier. **10**

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(b) For the circuit shown in figure 2 (V_{BE} = 0.7 V, βac =βdc = 100,Vcc=l2V, V_{EE}= -12V, R_E= 10KΩ Rs=100Ω and R'$_E$=100Ω Calculate i) Q point ii) Ad iii) Ac iv) CMRR **10**

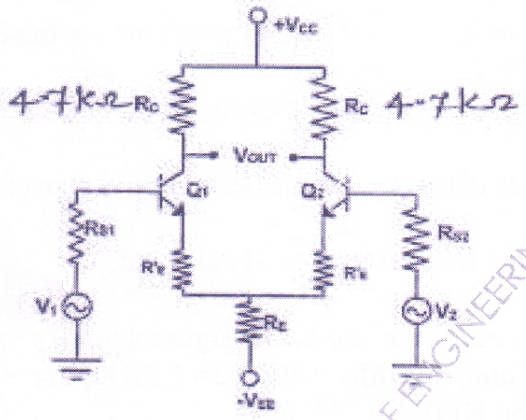

fig 2

6. (a) Explain practical cascode amplifier and derive the expression for Av, Ri and Ro **12**

(b) Explain why a voltage amplifier can not be used as good power Amplifier. **8**

7. Write a short note on following. (**any four**) **20**
   (a) Voltage series feedback
   (b) Distortion in power amplifier
   (c) Darlington connection
   (d) Design of Heat Sink
   (e) Barkhausen's Criteria for oscillation

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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_{CEX} (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.	θ_{j-a} °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	500 Ω	—	—	—
ECN 149	250 Ω	—	—	—
ECN 055	100 Ω	—	—	—
2N 3055	25 Ω	—	—	—

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	3·5	4·0
Ids 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
Ids 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
Ids 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_{fs} (typical)	$-V_p$ Volts	r_d	Derate above 25°C	θ_{j-a}
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