SE (BIO -) SEM - iii (CBSGS) May 2016

" ECAD - I " 30 · 05 · 2016

QP Code : 30708

(3 Hours) [Total Marks : 100

N. B. : (1) Question No. **1** is **compulsory**.

(2) Attempt any **three** questions from remaining **five** questions.

(3) Assume suitable data wherever necessary.

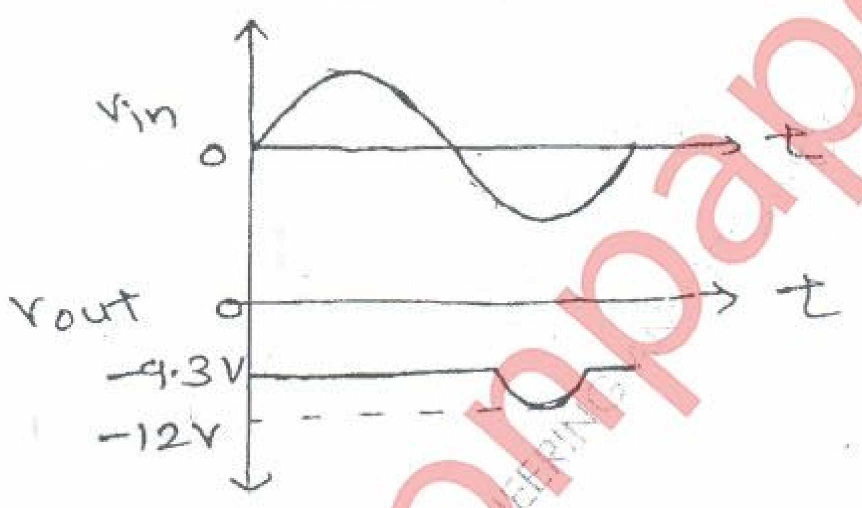
1. (a) Compare CE and CS amplitier. 5

(b) Draw and explain input-output characteristics in CB configuration. 5

(c) Explain working of enhancement type MOSFET with characteristics. 5

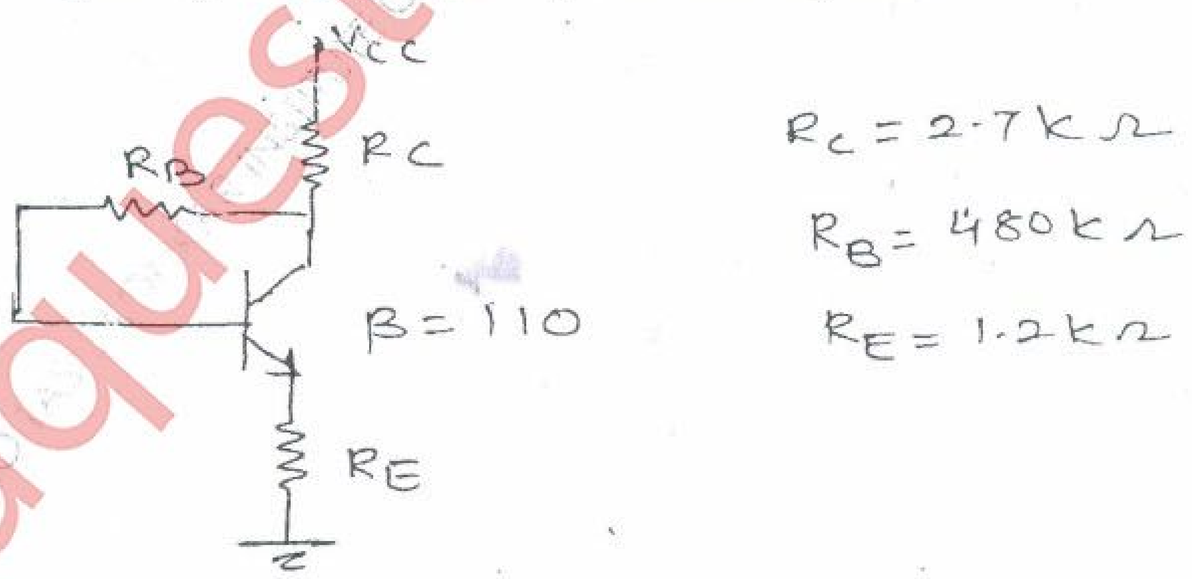
(d) Discuss Graphical Method of calculating h-parameters. 5

2. (a) Design a circuit which will give the following output waveterm. 5

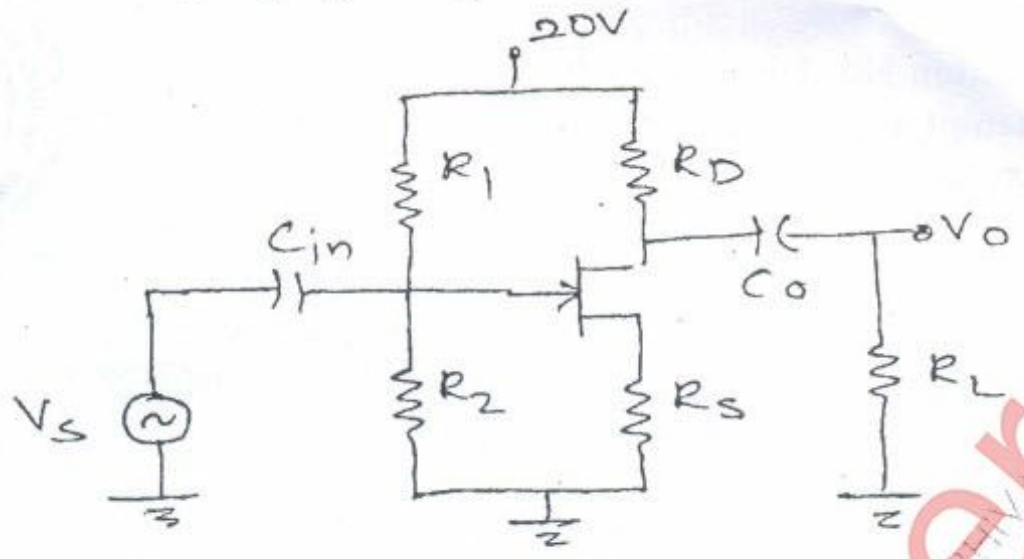


(b) Calculate for the following circuit 5

(i) I_B (ii) I_C (iii) V_{CE} (iv) BJT power consumption

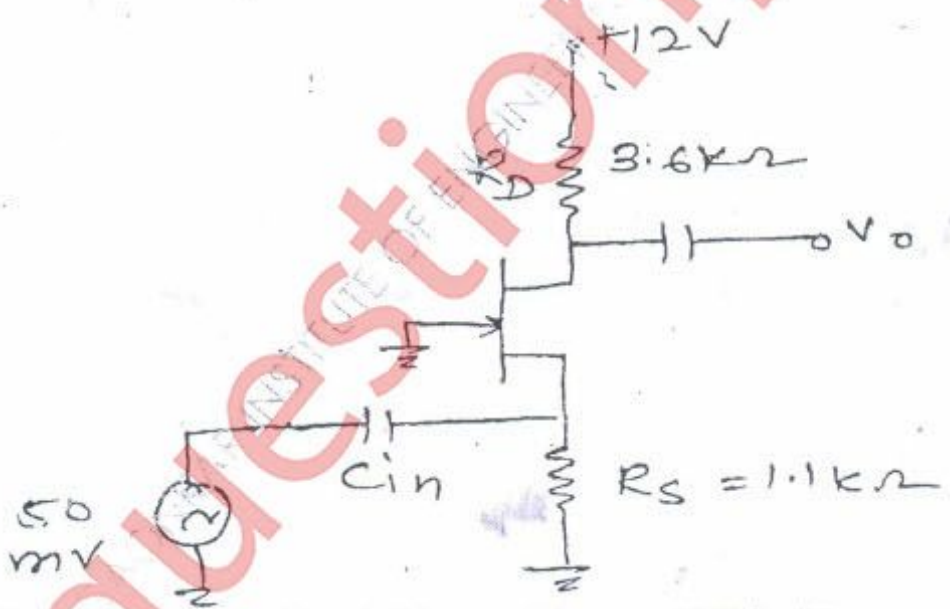


(c) Calculate A_V, R_{in}, R_O and f_L 10



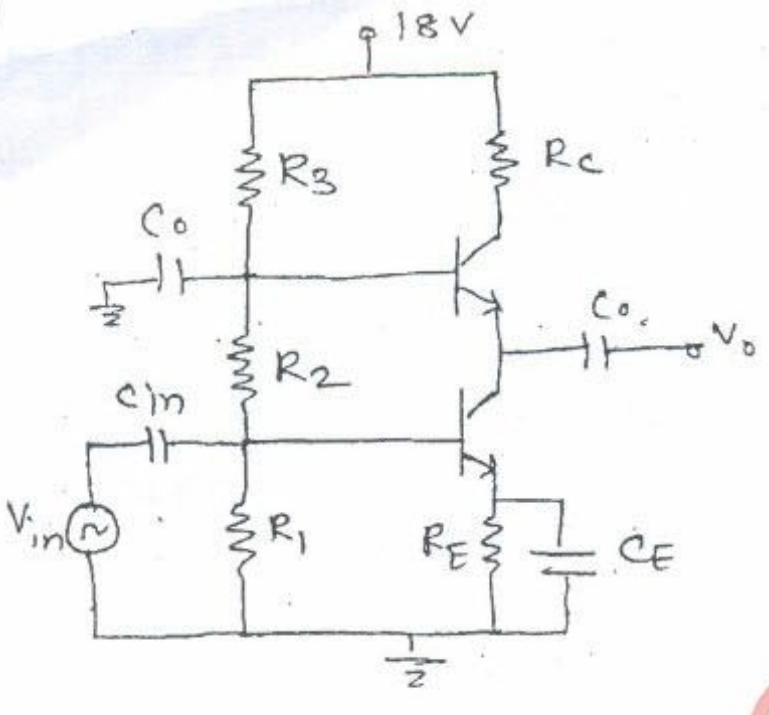
Given : $R_1 = 910k\Omega$, $R_D = 2.2\ k\Omega$
$R_2 = 220k\Omega$, $R_S = 1.2\ k\Omega$
$C_{in} = 47\mu F$, $C_O = 10\ \mu F$
$C_S = 1\mu F$, $R_L = 10\ k\Omega$
$r_d = \infty$, $g_m = 5.6\ m\Omega$

3. (a) Calculate Z_{in}, Z_O, A_V and V_O 10



Given : $I_{DSS} = 10mA$ $V_P = -4V$ $r_d = 40K\Omega$ $V_{GSQ} = -2.2\ V$

(b) Calcuate Q-point, A_V, Z_{in} 10

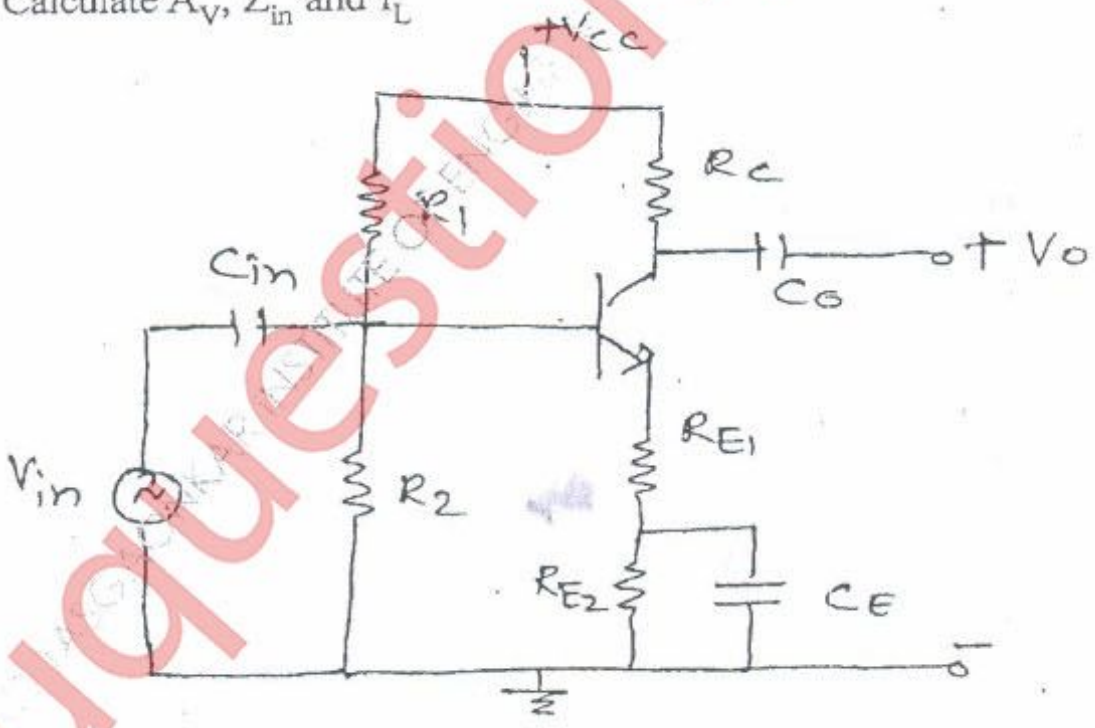


Given:
$V_{BB} = 0.6V$
$R_1 = 4.7k\Omega$
$R_2 = 5.6k\Omega$
$R_3 = 6.8k\Omega$
$R_E = 1k\Omega$
$R_C = 1.8k\Omega$
$\beta = 120$
$C_{in} = 5\mu F$
$C_o = 10\mu F$

4. (a) Design a single stage CE Amplifier for audio frequency range with $|A_v| = 220$, $S \leq 10$, $V_O = 4V$, $f_L \leq 20HZ$ 16

(b) For the above designed circuit calculate A_V, R_{in}, R_O 4

5. (a) Calculate A_V, Z_{in} and f_L 10



Given : hie = 1kΩ, hfe = 100, R_1 = 47 kΩ
R_2 = 10kΩ, R_C = 3.3kΩ, R_{E_1} = 470Ω,
R_{E2} = 470Ω, C_{in} = 10μF, C_O = 10μF, C_E = 4.7 μF

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(b) Draw low frequency and high frequency model of JFET in CS configuration and derive expressions for lower and higher cuit-off frequencies. (Consider by-pass capacitor) 10

6. Write short notes on (any **two**) :– 20

(a) Discuss Darlington Amplifier with circuit diagram, DC and AC analysis, advantages, disadvantages and applications.

(b) Draw various biasing schemes of BJT and calculate their stability factor.

(c) Draw a neat diagram of JFET CG amplifier. Derive expressions for A_V, Z_i, Z_O.

Transistor type	Pdmax @ 25°C Watts	Icmax @ 25°C Amps	$V_{ce}^{(sat)}$ volts d.c.	V_{cbo} 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	0·5	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	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

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}	g_{fs}	$-V_p$ 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_{eix} Volts max.	V_{sat} Volts	T_j max	η min.	η max.	R_{bb} KΩ min.	R_{bb} KΩ typ.	I_v 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