

SECESEM III) (B/GS Biomed.

Q.P. Code :27570

Electronic Circuit Analysis & Design

[Time: Three Hours]

[Marks:80]

Please check whether you have got the right question paper.

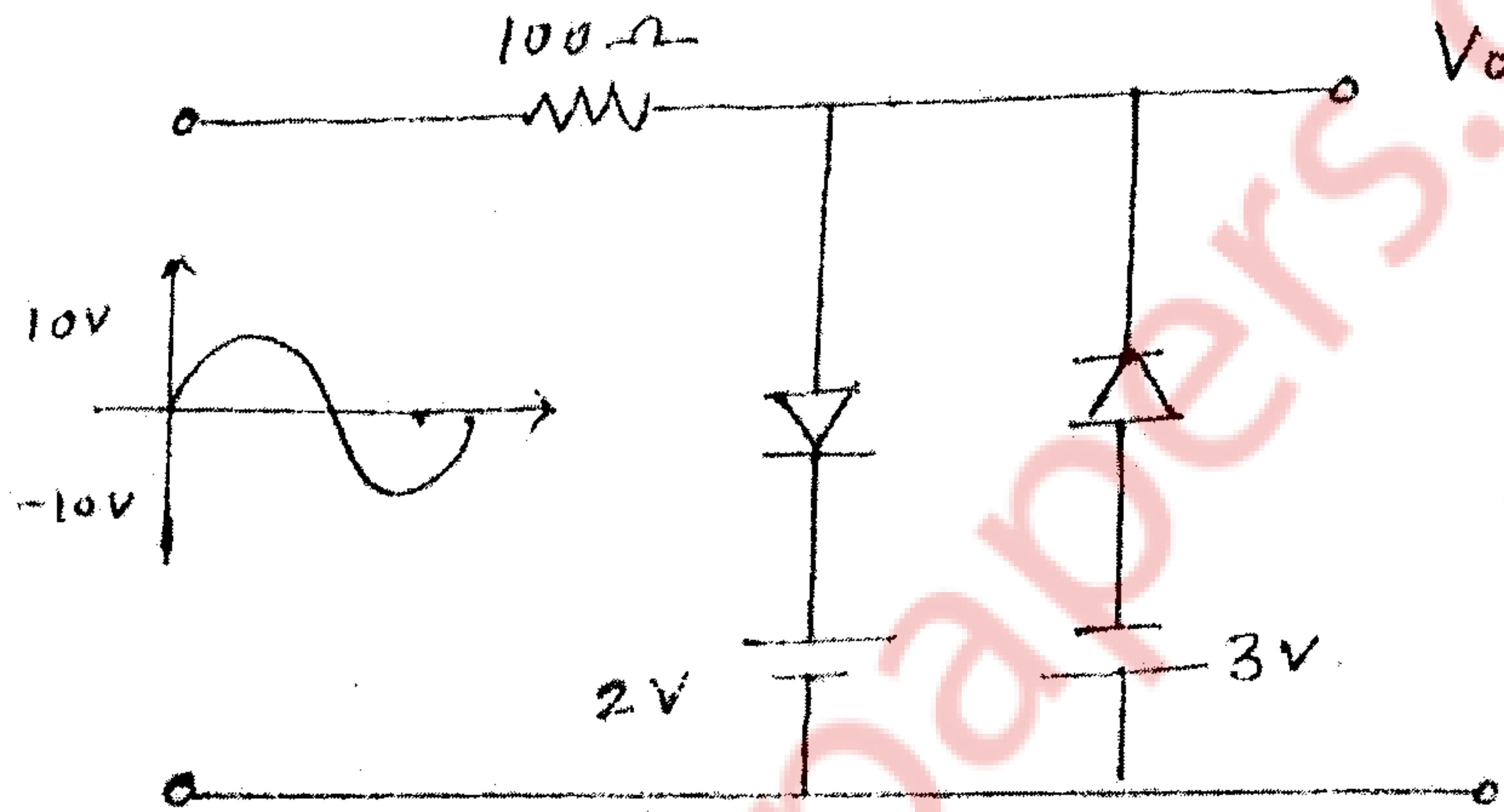
- N.B:
- 1) Question No. 1 is compulsory.
 - 2) Attempt any three out of remaining five questions.
 - 3) Assume suitable values of calculating.



Q.1 Answer the following questions.

- a) Explain BJT as a switch.
- b) Explain g_m and r_d for JFET. Also derive relation of g_m for JFET.
- c) Sketch output waveform for the circuit given below.

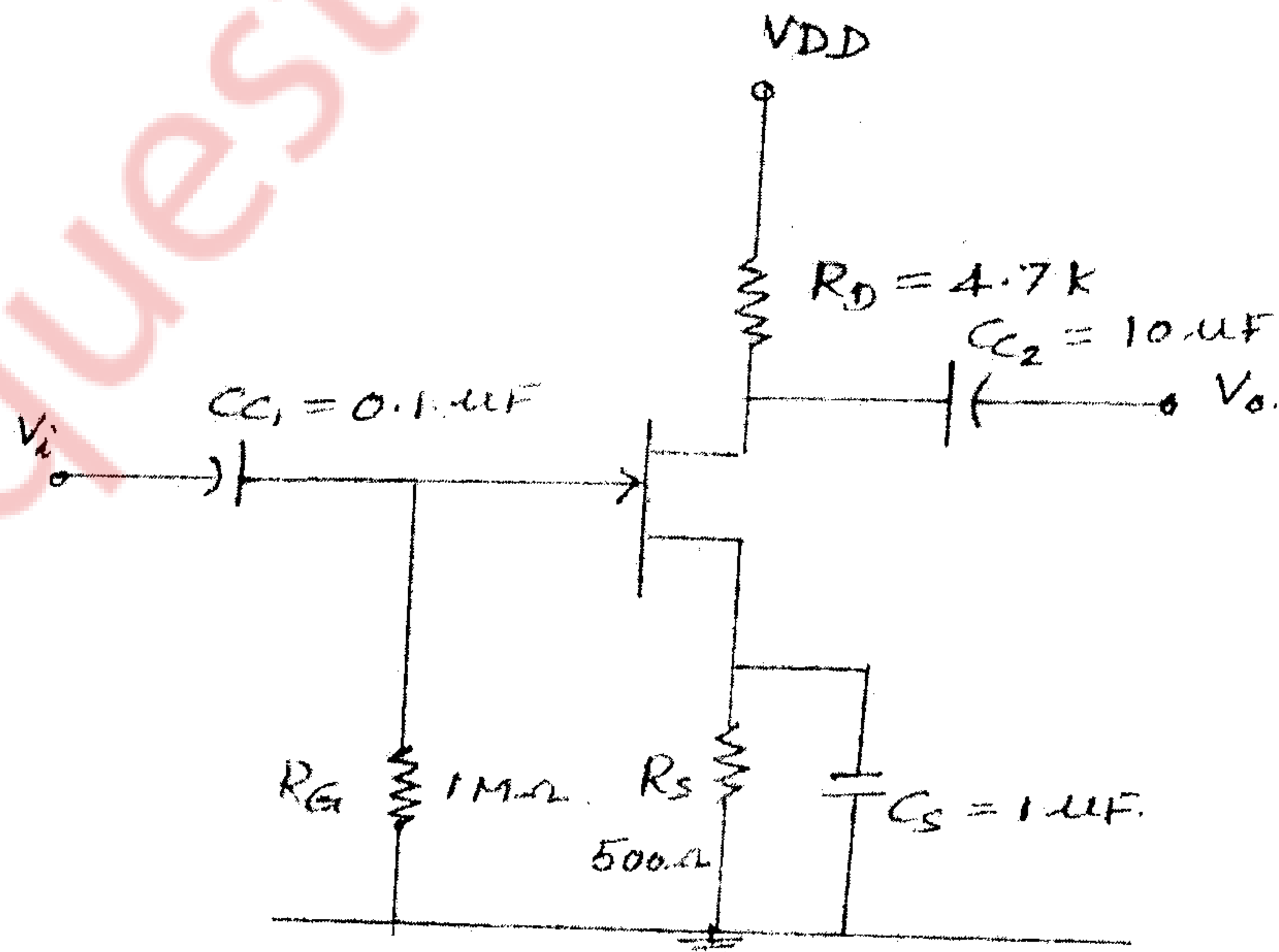
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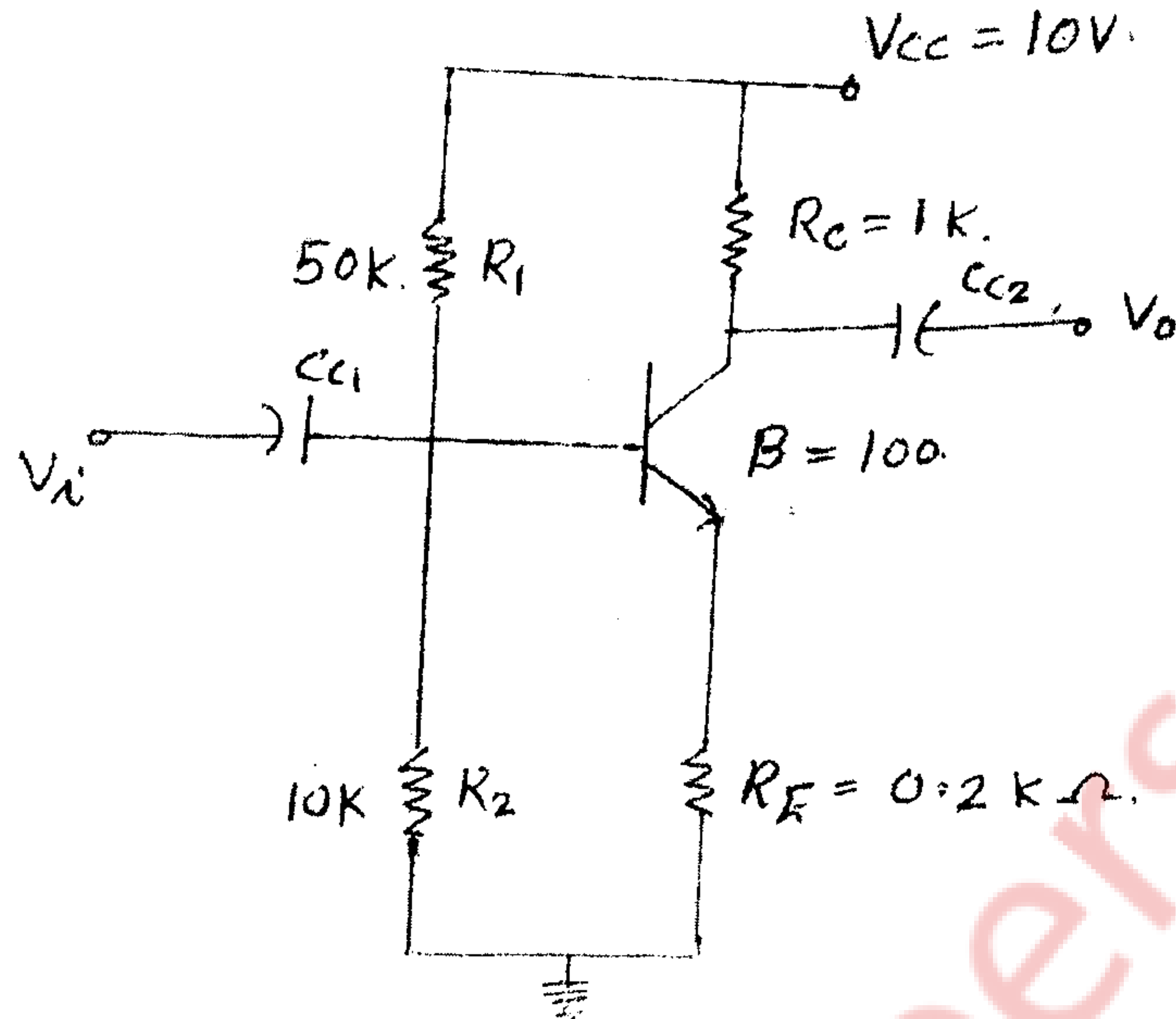
d) Sketch high frequency equivalent BJT and JFET.

Q.2 a) For the FET amplifier, calculate cut-off frequencies due to different capacitors. Which frequency will be dominant cut-off frequency? $V_{DD}=20V$, $V_P=-4V$, $Y_{OS} = 20MS$, $V_{GSQ} = -2.86V$.

[10]



- b) Find Q point parameter and A_v , R_i , R_o for the following circuits. If R_L is connected recalculate the gain. If R_E is bypassed recalculate the gain. [10]

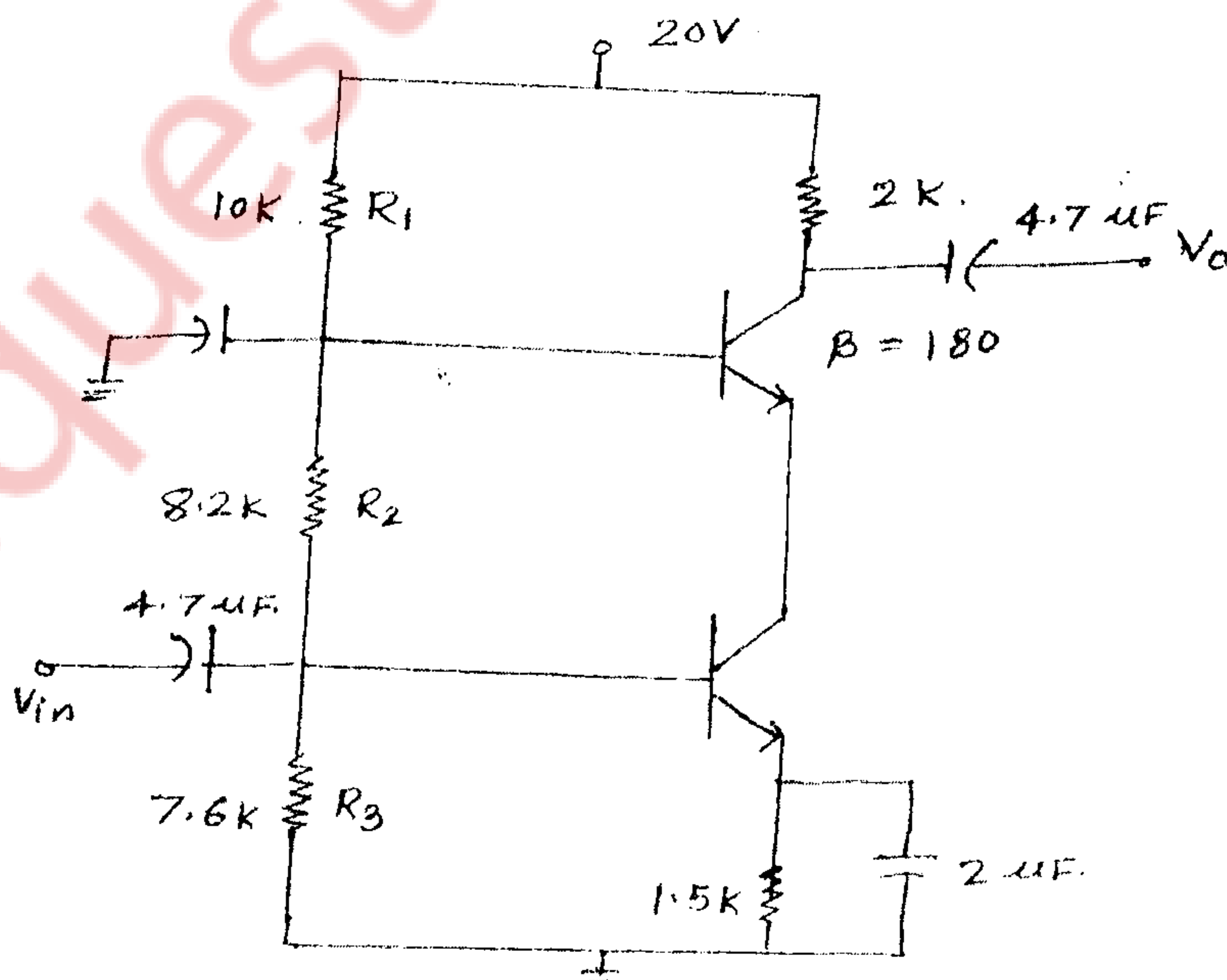


- Q.3** Design a single stage CE amplifier with stability factor less than 10 and voltage gain $|A_v| \geq 70$. Output voltage is 1.5v. Amplifier is to be used for audio frequency range of 15Hz to 15 KHz. Also determine following for the designed circuit. [20]

- a) A_v b) Z_i c) Z_o

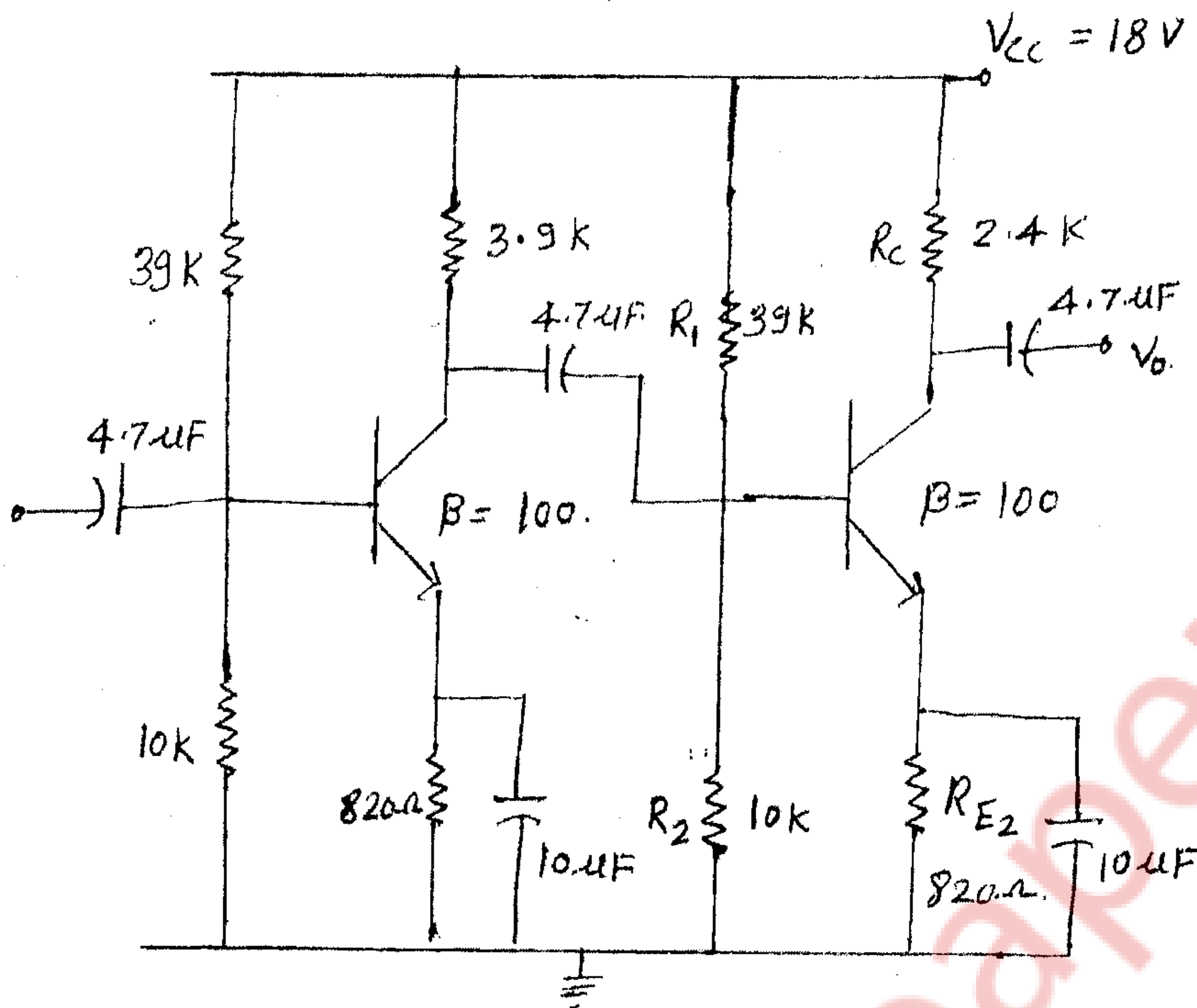
- Q.4** a) Derive relations for β_i , β_o , A_v , A_i for common base configuration of BJT amplifier. [10]
 b) With neat characteristics sketch, differentiate Enhancement and Depletion MOSFET. [10]

- Q.5** a) Write a short note on hybrid parameter. [05]
 b) With neat diagrams and sketches explain zener diode. [05]
 c) Determine the following for the practical cascode circuit shown in figure. [10]



Q.6 For the following circuit calculate Q point A_v , δ_i , δ_o , f_L

[20]



DBEC DATA SHEET

Transistor type	P_{dmax} Watts	I_{cmx} Amps	V_{ce} volts	V_{ce} volts	V_{ce} volts	V_{ce} volts	V_{ce} volts	V_{ce} volts	T_j °C	D.C. current			h_{fe} max.	V_{ce} max.	θ_{jc} °C/W	Derate above 25°C W/°C		
										min	typ.	max.					min.	typ.
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	—	—

N-Channel JFET

Type	V_{gs} max. Volts	V_{ds} max. Volts	V_{gs} max. Volts	f_z max. @25°C	T_j max.	I_{DSS}	g_{m0} (typical)	$-V_p$ Volts	r_d	Derate above 25°C	θ_{jc}
2N3822	50	50	50	300 mW	175°C	2 mA	3000 μS	6	50 $K\Omega$	2 mW/°C	0.59° C/mW
BFV 11 (typical)	30	30	30	300 mW	200°C	7 mA	5600 μS	2.5	50 $K\Omega$	—	0.59° C/mW

BFV 11—JFET MUTUAL CHARACTERISTICS

-V _{gs} volts	I _D max. mA		I _D typ. mA		I _D min. mA	
	0.0	10	7.0	4.0	4.0	3.0
0.2	0.4	0.6	0.8	1.0	1.2	1.6
0.4	0.6	0.8	1.0	1.2	1.6	2.0
0.6	0.8	1.0	1.2	1.6	2.0	2.4
0.8	1.0	1.2	1.6	2.0	2.4	2.8
1.0	1.2	1.6	2.0	2.4	2.8	3.2
1.2	1.6	2.0	2.4	3.0	3.6	4.0