

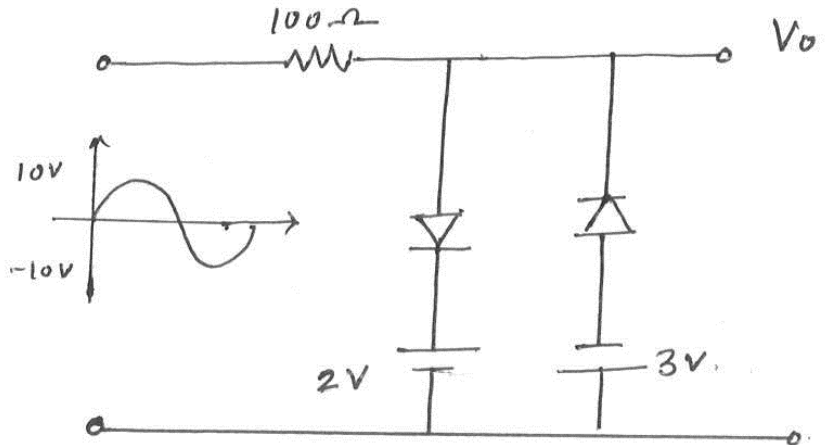
Please check whether you have got the right question paper.

- 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.

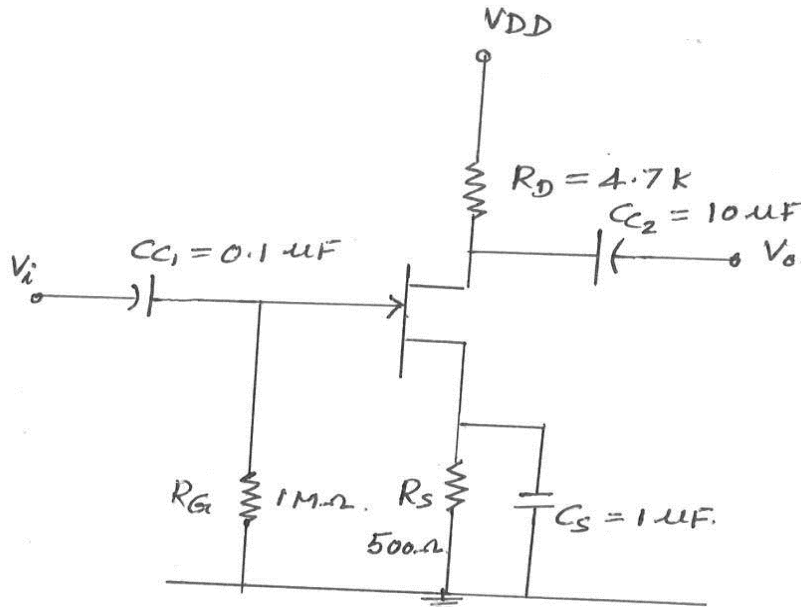
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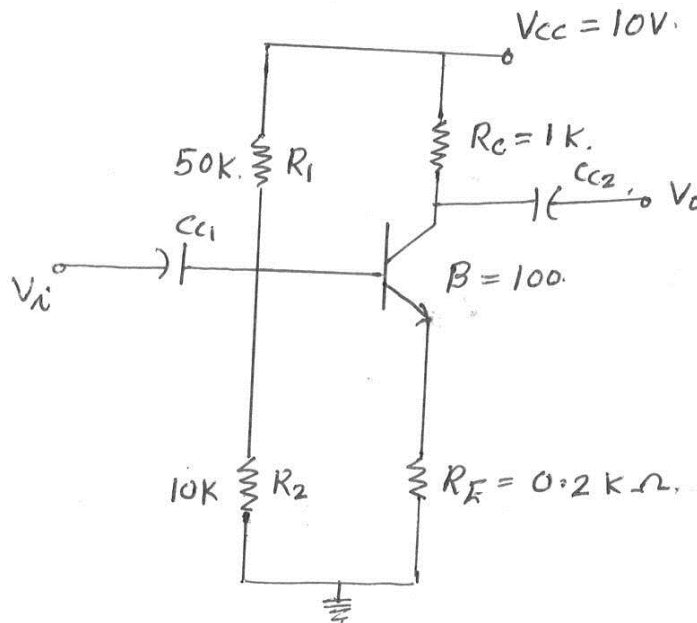
- d) Sketch high frequency equivalent BJT and JFET.

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

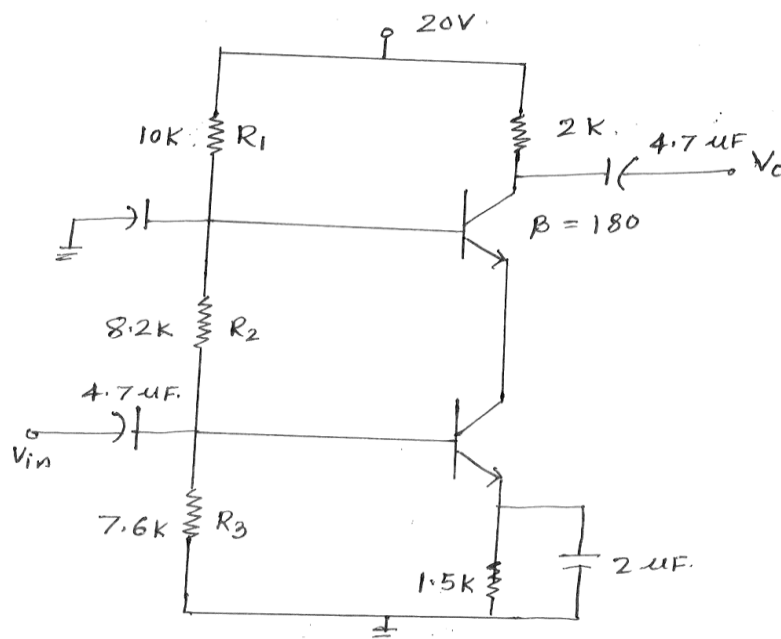
- Q.4 a)** Derive relations for Z_i , Z_o , A_v , A_i for common base configuration of BJT amplifier. [10]

- b) With neat characteristics sketch, differentiate Enhancement and Depletion MOSFET. [10]

- Q.5 a)** Write a short note on hybrid parameter. [05]

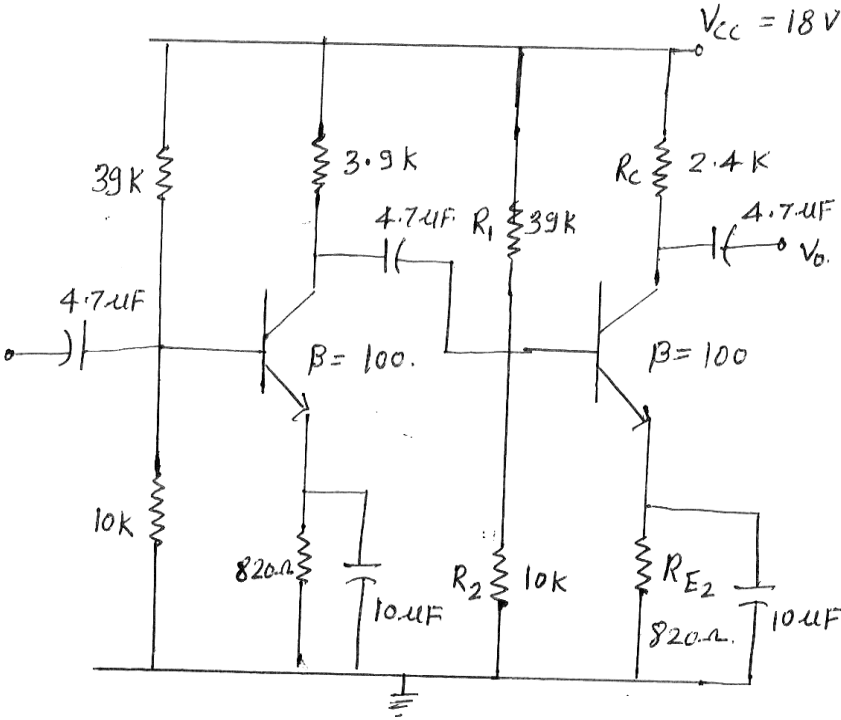
- b) With neat diagrams and sketches explain zener diode. [05]

- 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_{max} Watts	I_{emax} Amps	$V_{CE(40)}$ volts	V_{CE} d.c.	V_{CE0} volts	V_{CE0} (50V)	V_{CE0} (50V)	V_{CE0} (50V)	V_{CE0} (50V)	T_{max} °C	D.C. current gain			V_{BE} volts	T_{max} °C	θ_{jc} °C/W	Derate above 25°C	
											min	typ.	max.					min.
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	h_{ie}	h_{oe}	h_{re}	θ_{ja}
BC 147A	2.7 K Ω	18 μ V	1.5 $\times 10^{-4}$	0.4°C/mw
2N 525 (PNP)	1.4 K Ω	25 μ V	3.2 $\times 10^{-4}$	—
BC 147B	4.5 K Ω	30 μ V	2 $\times 10^{-4}$	0.4°C/mw
ECN 100	50 Ω	—	—	—
ECN 149	15 Ω	—	—	—
ECN 055	1.2 Ω	—	—	—
2N 3055	6 Ω	—	—	—

BFW 11—JFET MUTUAL CHARACTERISTICS												
-V _{GS} volts	I _{DS} max. mA		I _{DS} typ. mA		I _{DS} min. mA		g _{fs}		-V _P Volts		r _d	
	0-0	0-2	0-4	0-6	0-8	1-0	1-2	1-6	2-0	2-4		
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
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
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
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

N-Channel JFET

Type	V_{GS} 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_{ja}
2N3822	50	50	50	300 mW	175°C	2 mA	3000 μ V	6	50 K Ω	2 mW/°C	0.59°C/mw
BFW 11 (typical)	30	30	30	300 mW	200°C	7 mA	5600 μ V	2.5	50 K Ω	—	0.59°C/mw