

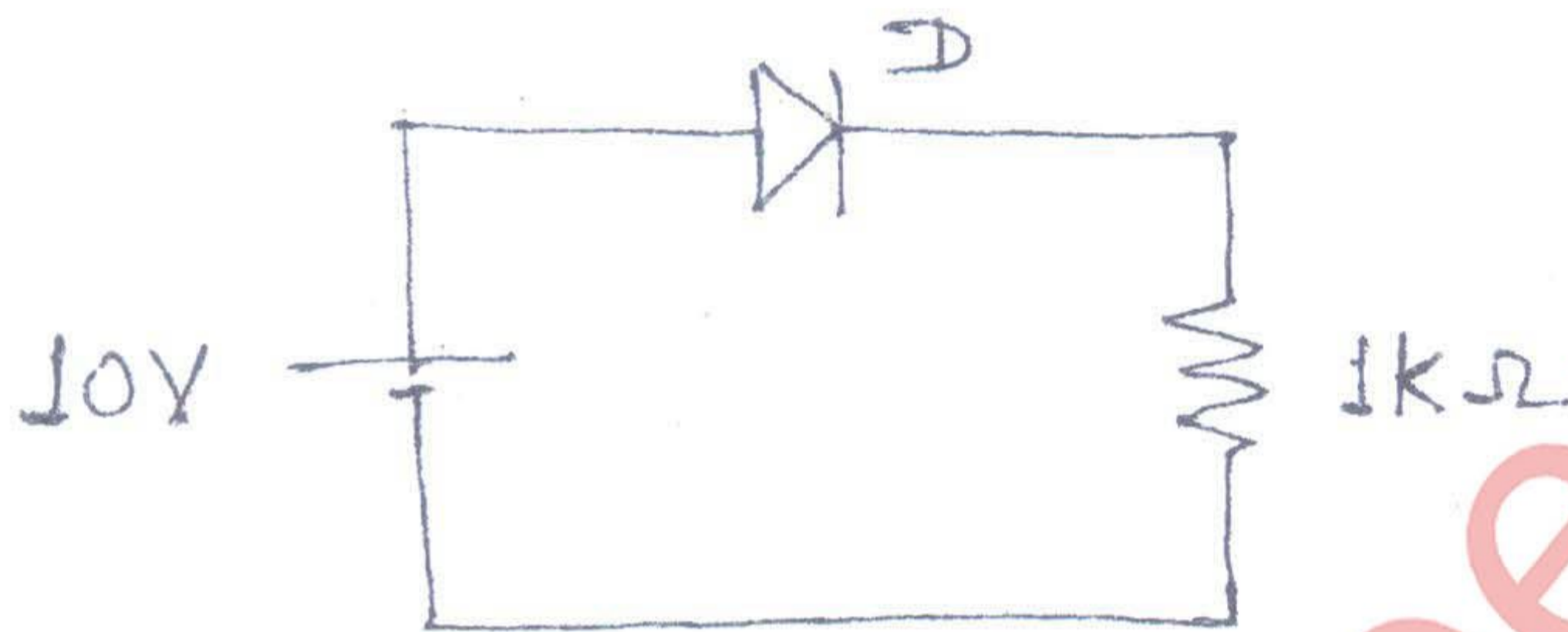
NB:

- 1 Question No.1 is compulsory and solve any THREE questions from remaining questions.
- 2 Assume suitable data if necessary
- 3 Draw clean and neat diagrams

Que-1 Solve any Four

Marks

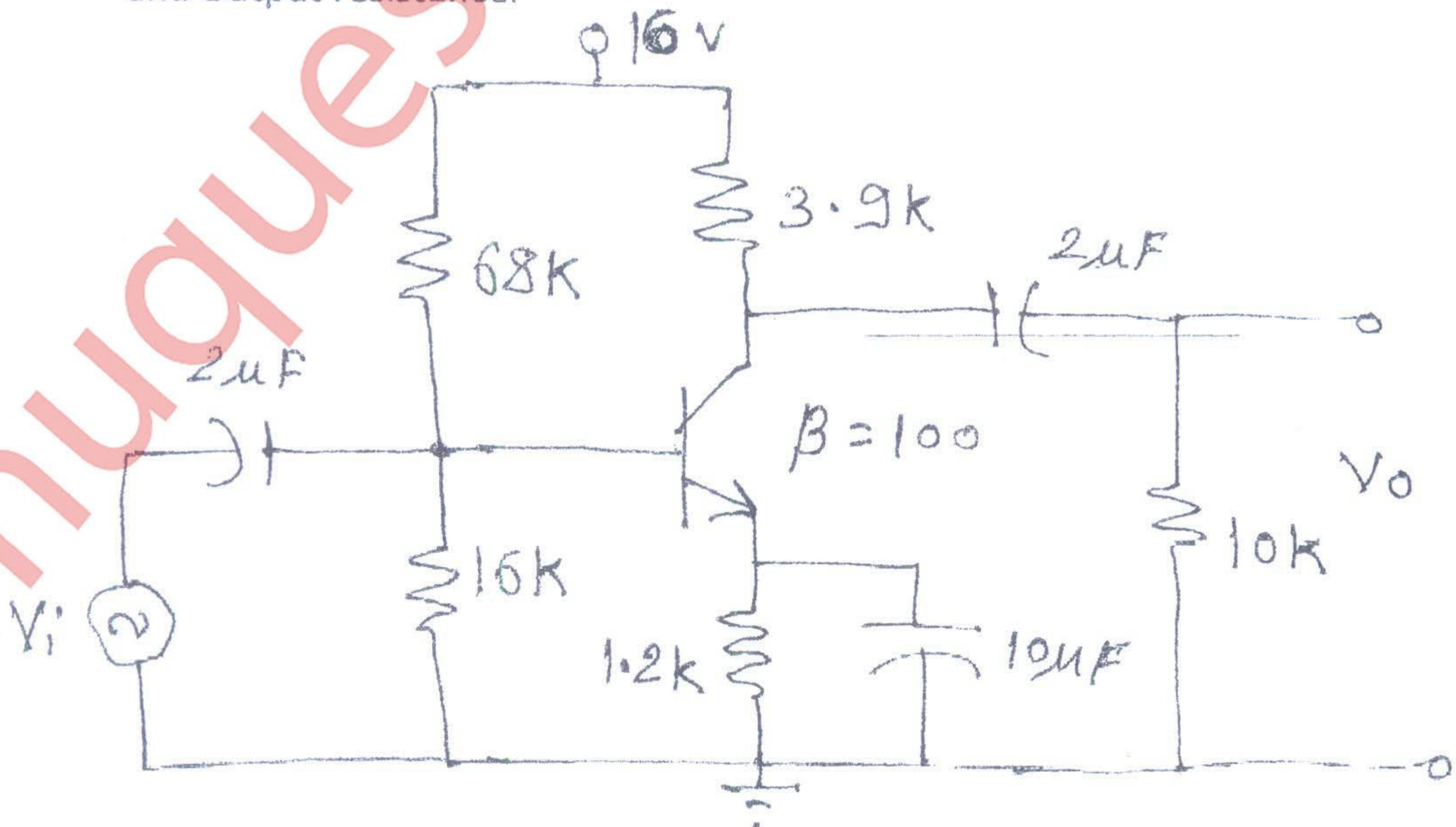
- a What is DC load line of a diode, draw DC load line for the given circuit. 5



- b Draw output characteristics of BJT in CE configuration and state the importance of Active region. 5
- c Justify how current flows in E Mosfet even in absence of channel inside. 5
- d How solar cell generates electricity, explain with the help of its structure. 5
- e What is the Voltage Regulator explain simple zener shunt voltage Regulator 5

Que-2a Define the followings related with diode 10
 a) Cut in voltage b) Forward characteristics c) Reverse characteristics d) Diffusion capacitance and e) Temperature effects

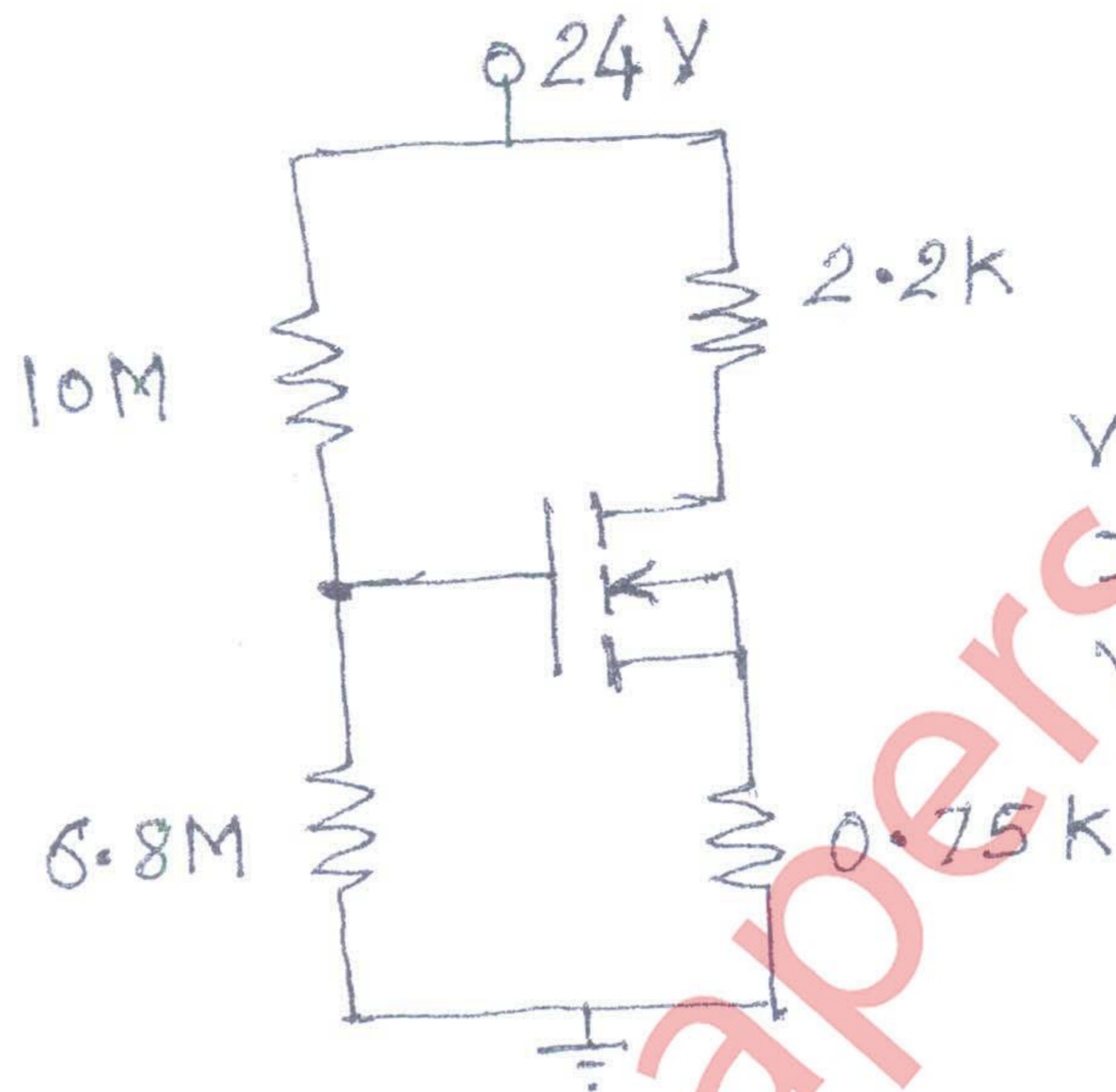
Que-2b For the given BJT circuit find Voltage Gain, Current Gain, Input Resistance and Output resistance. 10



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Que-3a For the given E Mosfet circuit Determine I_{dQ} and V_{DSQ}

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Que-3b Explain working and VI characteristics of Tunnel Diode

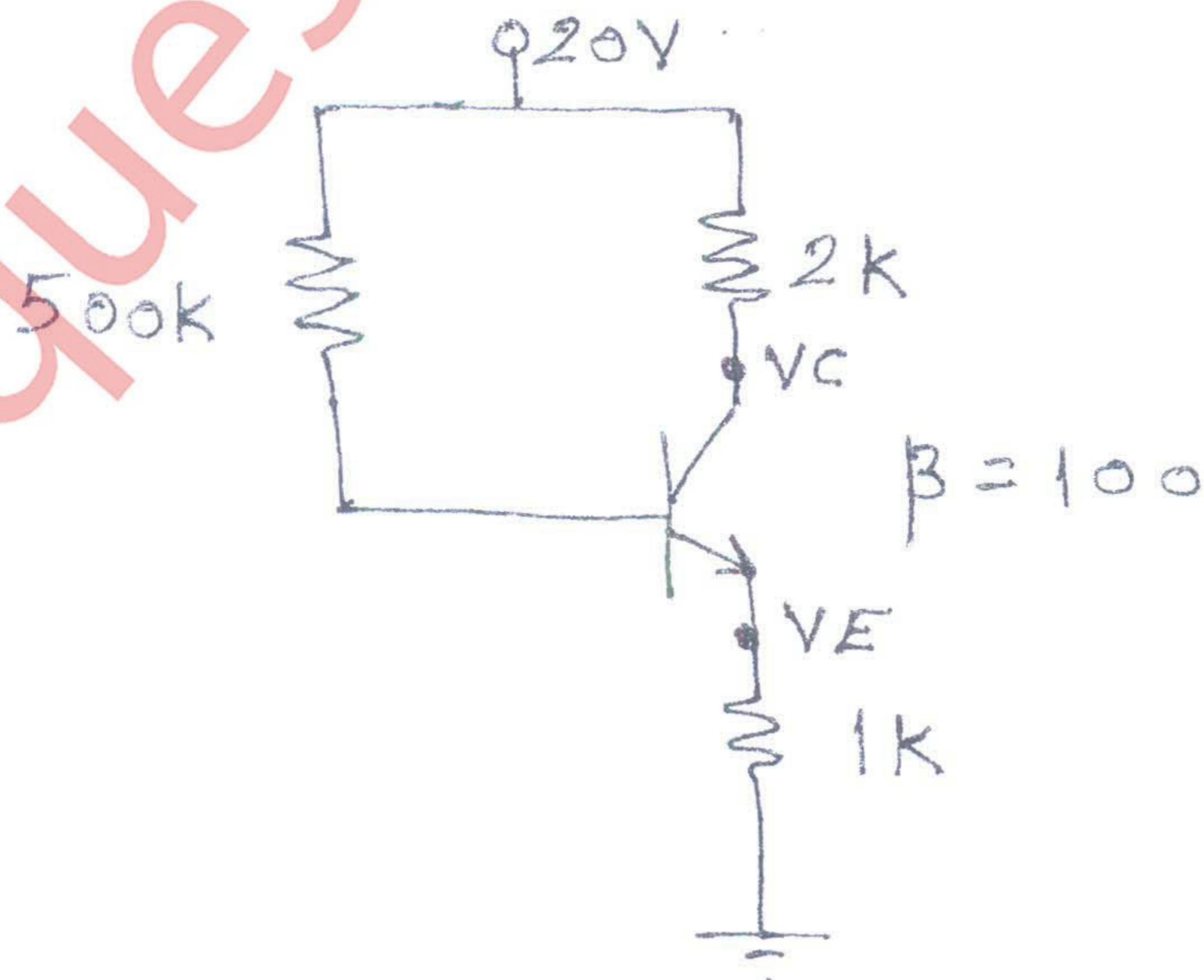
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Que-4a What is the use of Filter in Power supply, Draw circuit diagram of C-Filter and explain its operation.

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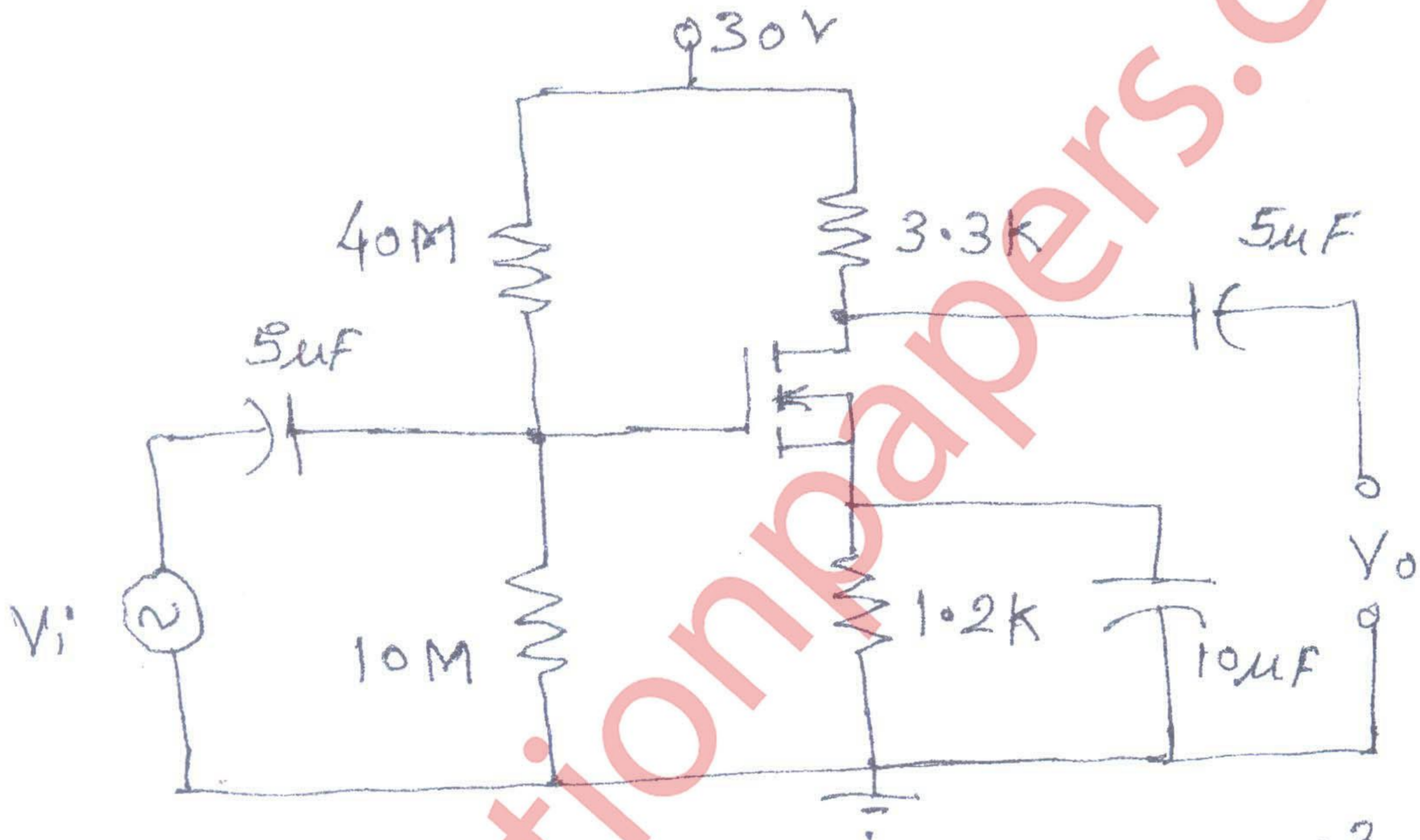
Que-4b Determine I_{CQ} , V_{CEQ} , V_C and V_E for the BJT based given circuit

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- Que-5a Design single stage CE amplifier for the following specifications 15
 $A_v \geq 100$, $v_o = 2.5\text{ V}$, $f_L = 20\text{ Hz}$, Stability factor $S=10$, use transistor BC 147 A
- Que-5b Draw Energy band diagram of diode under zero bias and under Forward bias. 05
- Que-6a For the given MOSFET amplifier circuit, find A_v , R_i and R_o 10



Given: $V_{GS(th)} = 3\text{ V}$, $k = 0.4 \times 10^{-3}$
 $r_d = 40\text{ K}\Omega$

- Que-6b Compare CB, CE and CC amplifiers 10

DBEC DATA SHEET

Transistor type	P_{dmax} Watts	I_{cmx} Amps	$V_{CE}^{(sat)}$ volts	d.c.	V_{CE0} volts	V_{CE0} (SUS) volts	V_{CE0} (SUS) volts	d.c.	V_{CE0} volts	V_{BE0} volts	d.c.	T_j^{max} °C	D.C. current			gain	Small min.	Signal typ.	h_{fe} max.	V_{RE} max.	θ_{fj} °C/W	Derate above 25°C W/°C
													min	typ.	max.							
2N 3055	115.5	15.0	1.1		100	60	70		90	7		200	20	50	70	15	50	120	1.8	1.5	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 S	1.5 $\times 10^{-4}$	0.4°C/mw
2N 525 (PNP)	1.4 K Ω	25 μ S	3.2 $\times 10^{-4}$	—
BC 147B	4.5 K Ω	30 μ S	2 $\times 10^{-4}$	0.4°C/mw
ECN 100	500 Ω	—	—	—
ECN 149	250 Ω	—	—	—
ECN 055	100 Ω	—	—	—
2N 3055	25 Ω	—	—	—

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_{mo} (typical)	$-V_p$ Volts	r_d	Derate above 25°C	θ_{ja}
2N3822	50	50	50	300 mW	175°C	2 mA	3000 μ S	6	50 K Ω	2 mW/°C	-0.59°C/mW
BFW 11 (typical)	30	30	30	300 mW	200°C	7 mA	5000 μ S	2.5	50 K Ω	—	0.59°C/mW

BFW 11—JFET MUTUAL CHARACTERISTICS

-V _{GS} volts	I _D (mA)									
	0.0	0.2	0.4	0.6	0.8	1.0	1.2	1.6	2.0	2.4
I _D max.	10	9.0	8.3	7.6	6.8	6.1	5.4	4.2	3.1	2.2
I _D typ.	7.0	6.0	5.4	4.6	4.0	3.3	2.7	1.7	0.8	0.2
I _D min.	4.0	3.0	2.2	1.6	1.0	0.5	0.0	0.0	0.0	0.0