

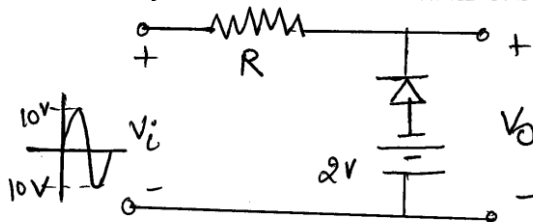
[Time: Three Hours]

[ Marks: 80]

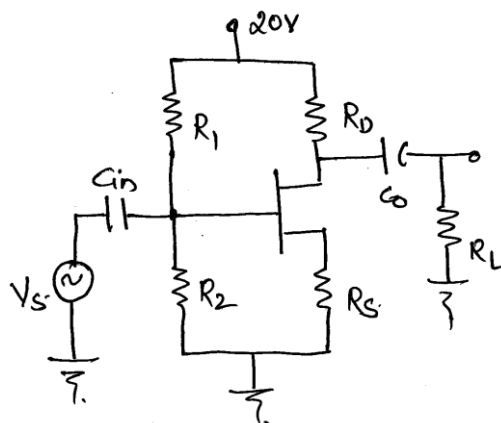
Please check whether you have got the right question paper.

- N.B:
1. Question no one is compulsory.
  2. Attempt any three questions from the remaining five.
  3. Assume suitable data if necessary.

- Q.1**
- a Discuss graphical method of calculating  $h$  parameters. 05
  - b Draw the  $i/p$  and  $o/p$  characteristics of D-MOSFET. 05
  - c Compare CE and CS amplifier. 05
  - d Sketch the  $o/p$  waveform for the following ckt. 05

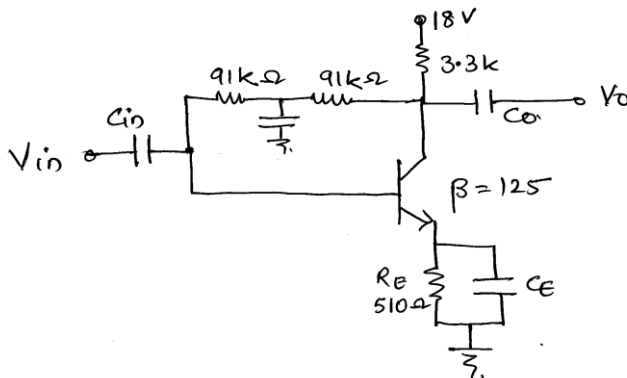


- Q.2** a Calculate  $A_v$ ,  $R_{in}$ ,  $R_o$  and  $f_L$  for the following ckt. 10



- Given:
- $R_1 = 910 \text{ k}\Omega$
  - $R_D = 2.2 \text{ k}\Omega$
  - $R_2 = 220 \text{ k}\Omega$
  - $R_S = 1.2 \text{ k}\Omega$
  - $G_n = 47 \mu\text{f}$
  - $C_o = 10 \mu\text{f}$
  - $C_S = 1 \mu\text{f}$
  - $R_L = 10 \text{ k}\Omega$

- b Determine  $I_{CEQ}$ ,  $V_{CEQ}$  & stability for the given network 10



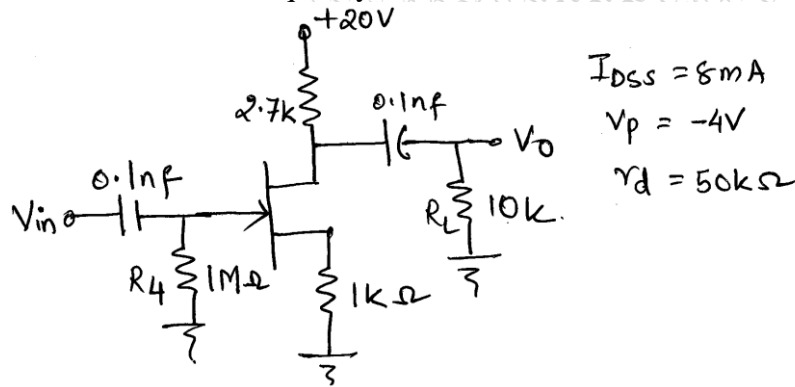
**Q.3** Design a single stage RC coupled CE amplifier to meet the following specifications. **20**

- i)  $|A_v| \geq 220$
- ii)  $S \leq 10, V_o = 4V, f_L = \leq 20Hz$
- iii) Calculate  $A_v, R_o$  and  $R_{in}$  for the above design

**Q.4 a** Draw and explain cascode amplifier. Drive expression for gain, input impedance & output impedance. State an application for the same. **10**

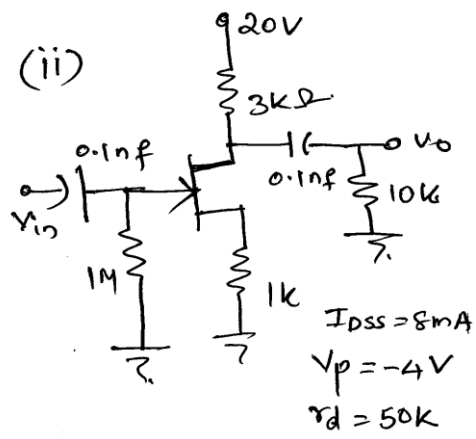
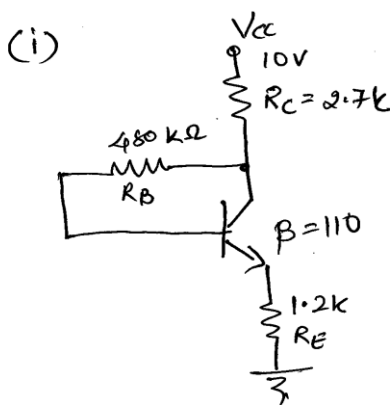
**b** For the JFET amplifier shown find the following **10**

- i) Q-point
- ii) Mid frequency voltage gain
- iii) Lower cut-off frequency.



**Q.5 a** Sketch zener diode characteristics and explain zener diode as a voltage regulator. **08**

**b** Determine the Q point for the following circuits. **12**



**Q.6** Write short notes on the following **20**

- 1 Explain thermal drift and early effect.
- 2 Draw Darlington amplifier. State its advantages disadvantages and application.
- 3 Draw frequency and high frequency model of JFET.
- 4 Comparison of CB, CC, and CE amplifier.

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DBEC DATA SHEET

Transistor type	P <sub>dmax</sub> @ 25°C Watts	I <sub>cmx</sub> @ 25°C Amps	V <sub>ce(sat)</sub> volts d.c.	V <sub>ce</sub> volts d.c.	V <sub>ce(sat)</sub> (Sus) volts d.c.	V <sub>ce</sub> volts d.c.	V <sub>beo</sub> volts d.c.	T <sub>j</sub> max °C	D.C. current		Small Signal		h <sub>fe</sub> max.	V <sub>be</sub> max.	θ <sub>jc</sub> °C/W	Derate above 25°C W/°C		
									mix	typ.	max.	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	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	—	—

BFV 11—JFET MUTUAL CHARACTERISTICS

-V <sub>gs</sub> volts	I <sub>oss</sub>		g <sub>ms</sub> (typical)		-V <sub>p</sub> Volts	r <sub>d</sub>	Derate above 25°C							
	0-0	0-2	0-4	0-6				0-8	1-0					
I <sub>ds</sub> 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
I <sub>ds</sub> 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
I <sub>ds</sub> 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 <sub>os</sub> max. Volts	V <sub>ds</sub> max. Volts	V <sub>gs</sub> max. Volts	P <sub>d</sub> max. @25°C	T <sub>j</sub> max.	I <sub>oss</sub>	g <sub>ms</sub> (typical)	-V <sub>p</sub> Volts	r <sub>d</sub>	Derate above 25°C
2N3822	50	50	50	300 mW	175°C	2 mA	3000 μS	6	50 KΩ	2 mW/°C
BFV 11 (typical)	30	30	30	300 mW	200°C	7 mA	5600 μS	2.5	50 KΩ	0.59°C/mW