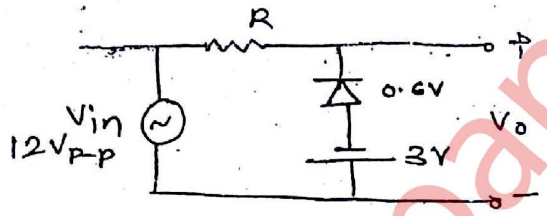
SE (Biomed) Sem III - CBGS (1)
ECAD - I
Electronic Circuits & Design - I (18)

QP Code :NP-18726

(3 Hours) [Total Marks : 80

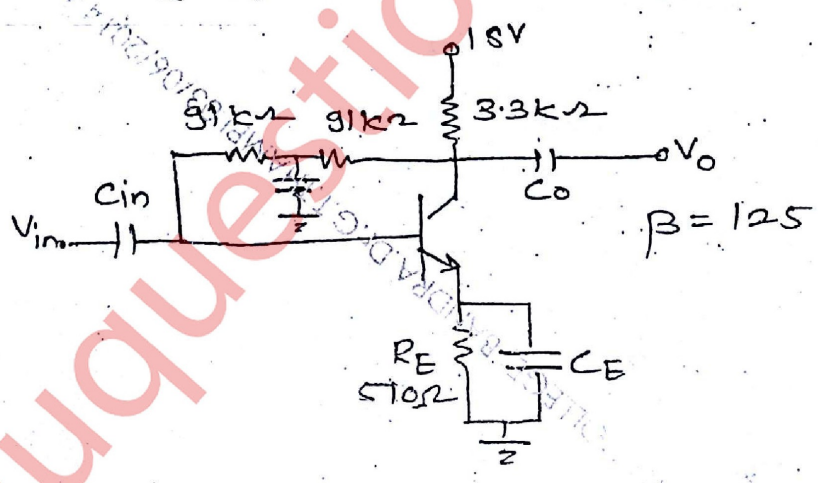
N. B. : (1) Question No. 1 is compulsory.
(2) Attempt any three from remaining five questions.
(3) Assume suitable data wherever necessary.

1. (a) Discuss Graphical Method of calculating h-parameters. 5
(b) Draw & Explain BJT input-output characteristics in CB configuration. 5
(c) Draw output of following circuit 5



(d) Derive mathematical expression for gm & calculate the value for gm if JFET has I_{DSS} = 12 mA. Pinch off voltage = – 6 V 5

(a) Determine I_{CQ}, V_{CEQ} & stability factor for the given network. 10



(b) For the JFET Amplifier shown 10
Find : 1) Q-point
2) Mid ... voltage gain
3) Low ... equency

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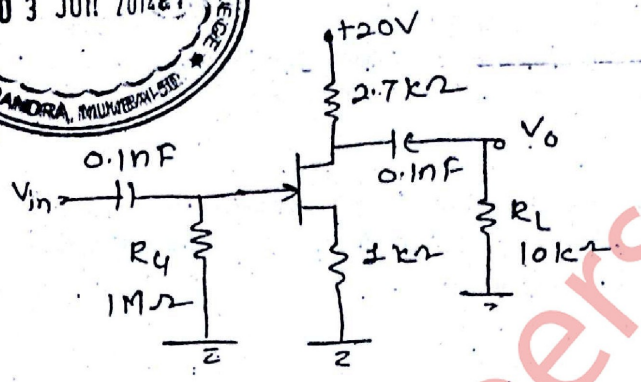
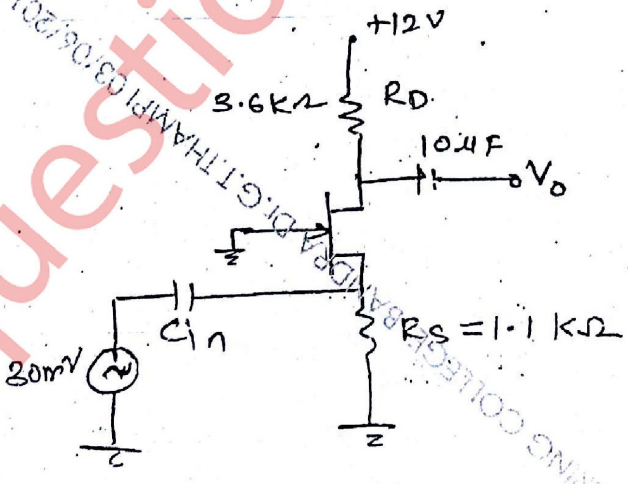


Given : I_{DSS} = 8 mA
V_P = – 4 V
rd = 50 kΩ

3. (a) Design a single stage RC coupled CE Amplifier to meet following specifications $|AV| \geq 220$, $S \leq 10$, $V_0 = 4$ V, $f_L \leq 20$ Hz **16**

(b) For the above design circuit calculate Av, Ro & Rin. **4**

4. (a) Calculate Zin, Zo, Av & Vo **10**



Given: I_{DSS} = 10 mA
V_P = – 4 V
rd = 40 kΩ
V_{GSQ} = – 2.2 V

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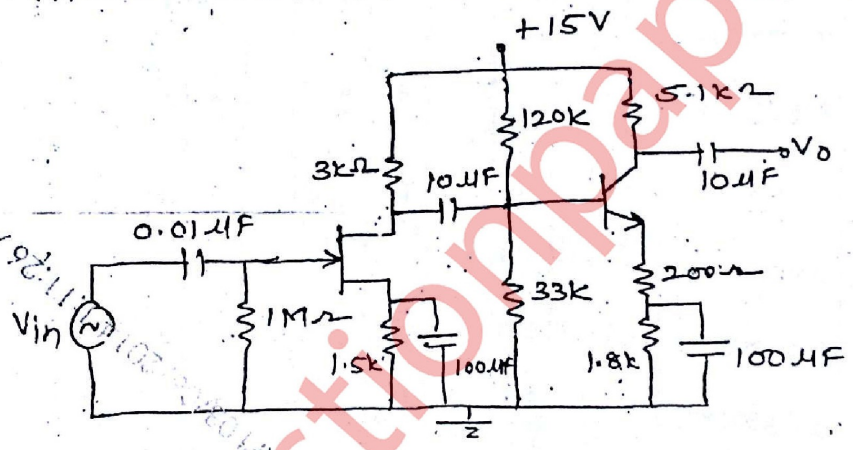
(3)

(b) Draw & Explain Cascade Amplifier. Derive expression for gain, input impedance & output impedance. Give Advantages, disadvantages & its applications. 10

5. For the following circuit, calculate following parameters. 20
   (a) Q point for BJT & FET
   (b) Input impedance
   (c) Output impedance
   (d) Mid-frequency voltage gain
   (e) Lower cut-off frequency (for BJT & FET)



for JFET,
I_{DSS} = 1.6 mA
V_P = – 4 V
V_{GSQ} = – 1.5 V

for BST,
h_{ie} = 2.7 kΩ
h_{fe} = β = 80

6. Attempt any **two** : 20
   (a) Explain working of Enhancement MOSFET. Draw input-output characteristics. Compare E-MOSFET with D-MOSFET.
   (b) Discuss Low frequency & High frequency Analysis of JFET.
   (c) Discuss Darlington Amplifier with ckt diagram, DC and AC analysis, advantages, disadvantages and applications.

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DBSC DATA SHEET

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_{CER} (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	0·6	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
BC147A	2·7 K Ω	18μ ℧	1·5 × 10⁻⁴	0·4°C/mw
2N525 (PNP)	1·4 K Ω	25μ ℧	3·2 × 10⁻⁴	—
BC147B	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
Ids 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
Ids 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
Ids 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_{mo}	$-V_p$ Volts	r_d	Derate above 25°C
2N3822	50	50	50	300 mW	175°C	2 mA	3000 μ℧	6	50 KΩ	2 mW/°C
BFW 11 (typical)	30	30	30	300 mW	200°C	7 mA	5600 μ℧	2·5	50 KΩ	—

UJT type	P_d max. @25°C	I_e max. @25°C	I_e peak pulse current max.	V_{B2E} Volts max.	V_{B2B1} Volts	T_j max	η min.	η max.	R_{BB} KΩ min.	R_{BB} KΩ typ.	Max.	I_v max. μA
2N2646	300mW	50mA	2Amp.	30	35	125°C	0·56	0·75	4·7	7·0	9·1	5·0