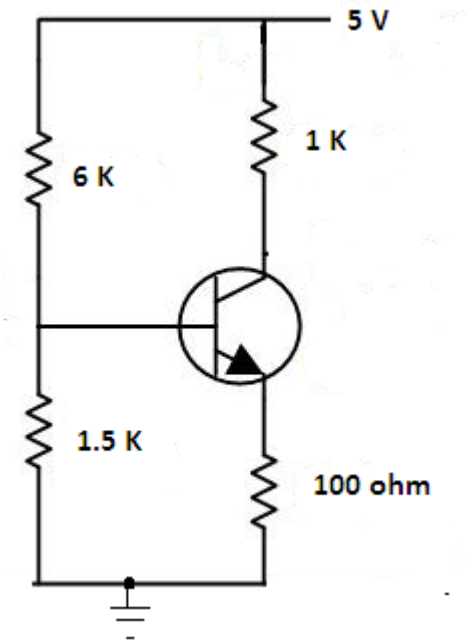
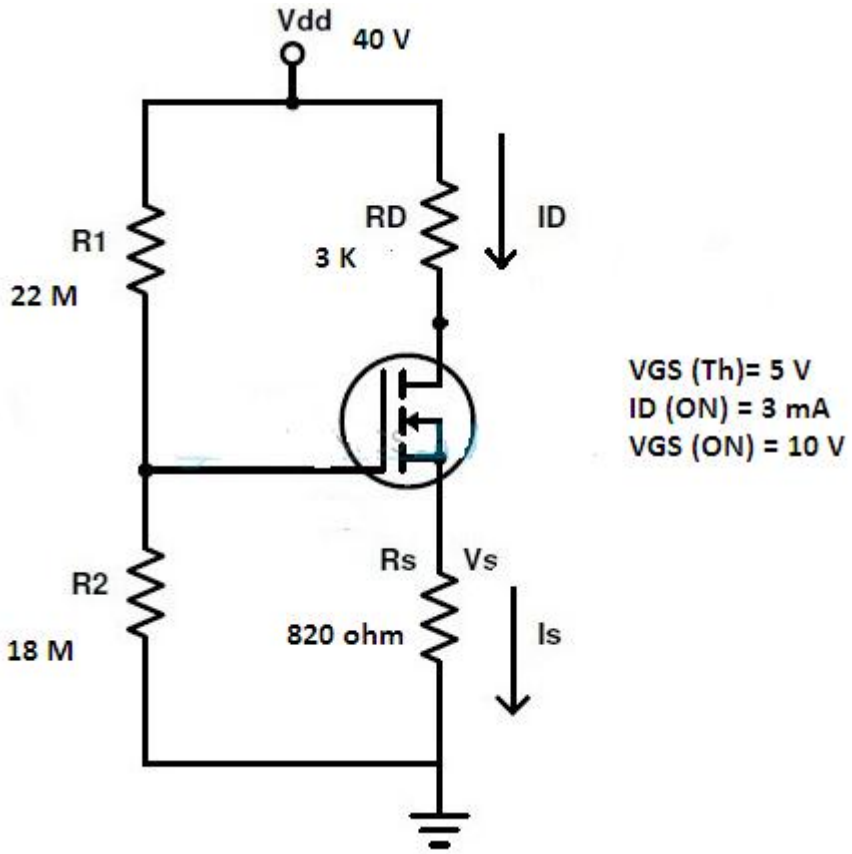
(3 Hours) **Maximum Marks 80**

N.B: (1) Question No.1 is compulsory.
(2) Solve any three out of remaining question.
(3) Assume suitable data if necessary.

Que-1	Solve **any Four**	Marks
a	What happens when pn junction diode is made forward bias, explain considering any suitable application.	5
b	Explain how CC configuration of BJT gives voltage gain less than 1	5
c	Explain with the help of construction that MOSFET gives more Input resistance than JFET	5
d	What is varactor Diode, also state its applications.	5
e	Compare C, L and LC filters.	5
Que-2a	Draw Energy band diagram of pn junction diode under i) Zero Bias ii) Forward bias and iii) Reverse Bias	10
Que-2b	For the given circuit find Steady State DC Parameters Icq and Vceq Given **β = 100** and **VBE = 0.7 V,** also state in which region the circuit is working.	10



Que-3a For the given MOSFET amplifier , Determine IDq, VGSq and VDS. 10



Que-3b Explain working principle, characteristics and applications of Photodiode. 10

Que-4a What is the need of Filters, Explain L filter circuit? 10

Que-4b For the voltage divider biased BJT amplifier without bypass capacitor circuit derive equation of Input resistance, Voltage gain, current gain and output resistance. 10

Que-5a Design Single Stage CE amplifier for the given specifications 15
Av ≥ 100, S =10, Vo = 3 V, fL =20 HZ, use transistor BC 147 B
Use coupling and bypass capacitor as C1 = C2 = 10 µF and CE = 100 µF.

Que-5b What is Clamping circuit, explain with neat Input and output waveforms for negative Clamping circuit. 05

Que-6a For the voltage divider biased E MOSFET circuit derive equation of Input Resistance, Voltage gain and output resistance. 10

Que-6b Derive equation of Input resistance, Current gain and Voltage gain for CC amplifier. 10

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DBEC 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_{BEO} volts d.c.	T_j max °C	D.C. current gain min	typ.	max.	Small Signal min.	typ.	h_{fe} max.	V_{BE} max.	θ_{fa} °C/W	Derate above 25°C W/°C
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	hie	hoe	hre	θja
BC 147A	2·7 K Ω	18μ ℧	1·5 × 10^{-4}	0·4°C/mw
2N 525 (PNP)	1·4 K Ω	25μ ℧	3·2 × 10^{-4}	—
BC 147B	4·5 K Ω	30μ ℧	2 × 10^{-4}	0·4°C/mw
ECN 100	50 Ω	—	—	—
ECN 149	15 Ω	—	—	—
ECN 055	12 Ω	—	—	—
2N 3055	6 Ω	—	—	—

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	3·5	4·0
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	0·5	0·0
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	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	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_{os} (typical)	$-V_p$ Volts	r_d	Derate above 25°C	θ_{ja}
2N3822	50	50	50	300 mW	175°C	2 mA	3000 μ ℧	6	50 KΩ	2 mW/°C	0·59°C/mW
BFW 11 (typical)	30	30	30	300 mW	200°C	7 mA	5600 μ ℧	2·5	50 KΩ	—	0·59° C/mW

Q.P. Code: 36426