

[3 Hours]

[Total Marks :-80]

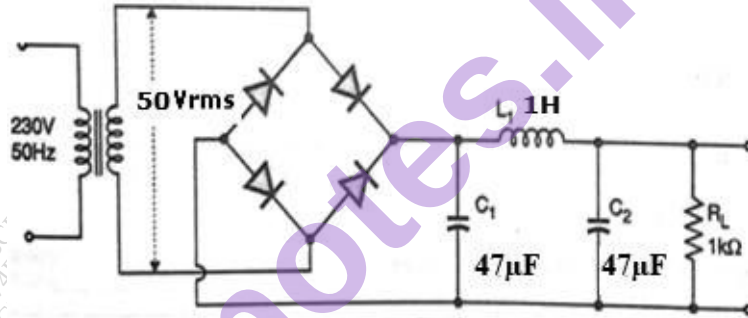
- N.B:** (1) Question No.1 is compulsory.
 (2) Solves any three out of remaining question.
 (3) Assume suitable data if necessary.

1. Any four

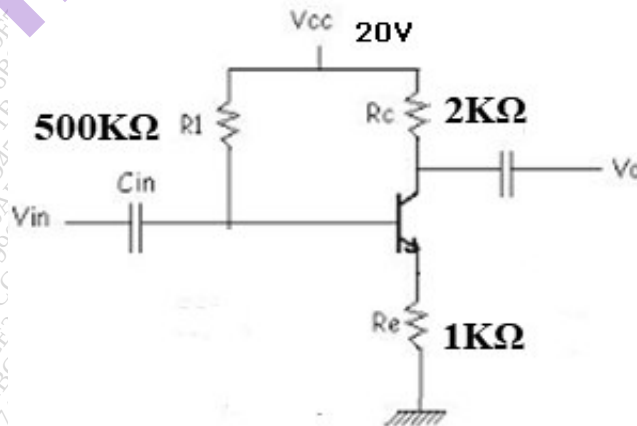
- Draw characteristics of PN junction in thermal equilibrium and explain. 5
- Explain the operation of MOSFET as amplifier. 5
- Explain construction, working principle and characteristics of Photodiode. 5
- Compare HWR, FWR and Bridge rectifier. 5
- Compare Zener and avalanche breakdown 5

2.

- Draw and explain positive and negative clamper circuit. 10.
- Calculate dc load voltage, an ac ripple in output and ripple factor 10

**3.**

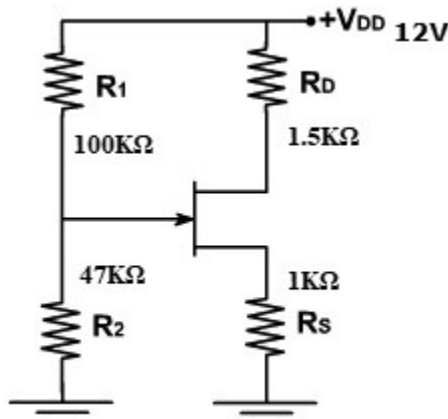
- Draw and explain VI and CV characteristics of p-channel Enhancement type MOSFET. 10
- Find I_B , I_C , V_C , V_E , and V_{CE} for following circuit ($\beta=100$). 10



4

- a. Find V_{GSQ} , I_{DQ} , and V_{DSQ} for following circuit. ($V_P = -4V$, $I_{DSS} = 6mA$)

10



- b. Compare CE, CB and CC amplifiers

10

5.

- a. Design single stage CE amplifier for $A_V \geq 110$, $V_{Orms} = 3V$, $h_{FE} = 180$, $h_{fe} = 220$

$$h_{ie} = 2.7 K\Omega, S \leq 10, f_L \leq 15Hz, V_{CE sat} = 0.25V, V_{BE} = 0.7V.$$

15

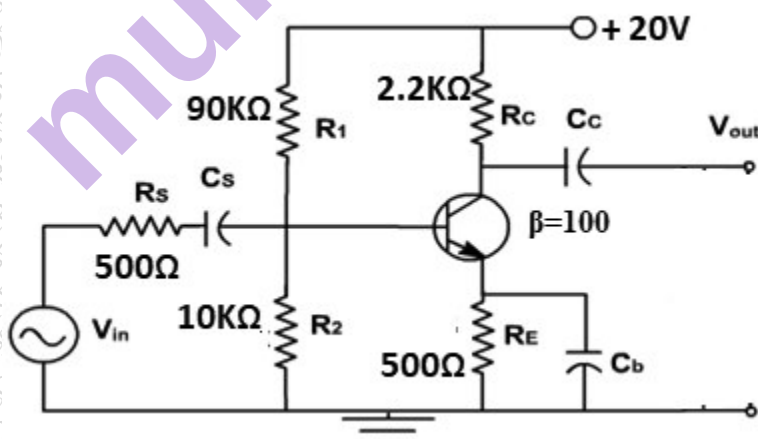
- b) Compare D-MOSFET and E-MOSFET.

05

6

- a. Find Z_i , Z_o , A_v and A_{vs} for following circuit.

10



- b) Compare capacitor, inductor, LC and π filter.

10

DBEC DATA SHEET

Transistor type	P _{dmax} Watts	I _{cmax} Amps	V _{ce(sat)} volts	V _{ce0} volts	V _{ce0} (SUS)	V _{ce0} (SUS)	V _{ce0} (SUS)	V _{ce0} (SUS)	V _{ce0} (SUS)	D.C. current T _j max °C	gain typ.	Small signal h _{fe} typ.	h _{fe} max.	V _{as} max.	θ _{ja} °C/W	Derate above 25°C W/°C
2N 3055	115-5	15-0	1-1	100	60	70	90	7	200	20	50	15	50	1-8	1-5	0-7
ECN 055	50-0	5-0	1-0	60	50	55	60	5	200	25	50	25	75	1-5	3-5	0-4
ECN 149	30-0	4-0	1-0	50	40	—	—	8	150	30	50	33	60	1-2	4-0	0-3
ECN 100	5-0	0-7	0-6	70	60	65	—	6	200	50	90	50	90	0-9	35	0-05
BC147A	0-25	0-1	0-25	50	45	50	—	6	125	115	180	125	220	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	240	330	0-9	—	—

Transistor type	h _{ie}	h _{oe}	h _{re}	θ _{ja}	BFV 11—JFET MUTUAL CHARACTERISTICS											
					—V _{as} volts	0-0	0-2	0-4	0-6	0-8	1-0	1-2	1-6	2-0	2-4	2-5
BC 147A	2-7 K Ω	18 μ Ω	1-5 × 10 ⁻⁴	0-4°C/mw	—	—	—	—	—	—	—	—	—	—	—	—
2N 525 (PNP)	1-4 K Ω	25 μ Ω	3-2 × 10 ⁻⁴	—	—	—	—	—	—	—	—	—	—	—	—	—
BC 147B	4-5 K Ω	30 μ Ω	2 × 10 ⁻⁴	0-4°C/mw	—	—	—	—	—	—	—	—	—	—	—	—
ECN 100	50 Ω	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
ECN 149	15 Ω	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
ECN 055	12 Ω	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2N 3055	6 Ω	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

N-Channel JFET

Type	V _{as} max. Volts	V _{ds} max. Volts	V _{gs} max. Volts	P _d max. mW	T _j max. °C	I _{ss} mA	g _{fs} (typical) μ S	-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
BFV 11 (typical)	30	30	30	300 mW	200°C	7 mA	5600 μ S	2-5	50 K Ω	—	0-59°C/mW