

(3 hrs.)

Maximum Marks = 80

Q1. is compulsory.

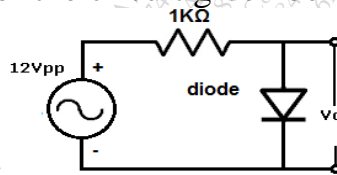
Attempt any **three** question from **Q.2 to Q.6.**

Assume suitable data if necessary.

Q.1 Write any **four**.

20

- Explain working of pn junction diode and its V-I characteristics.
- What is early effect in BJT?
- Explain Zener diode as a voltage regulator.
- Write short note on Tunnel diode.
- Draw output waveform for the circuit given below

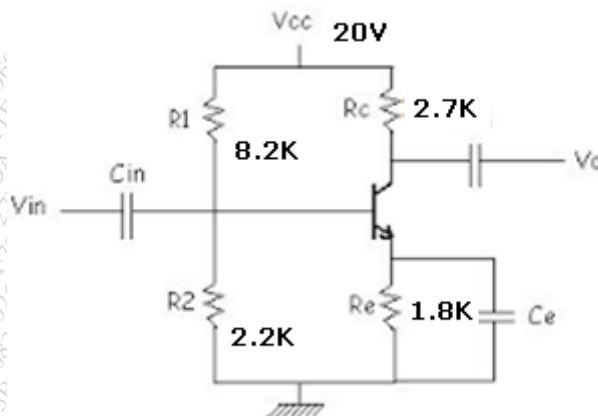


Q.2

- Explain construction and working of solar cell and LED.
- Find Q point if $\beta=120$. Also draw dc load line.

10

10

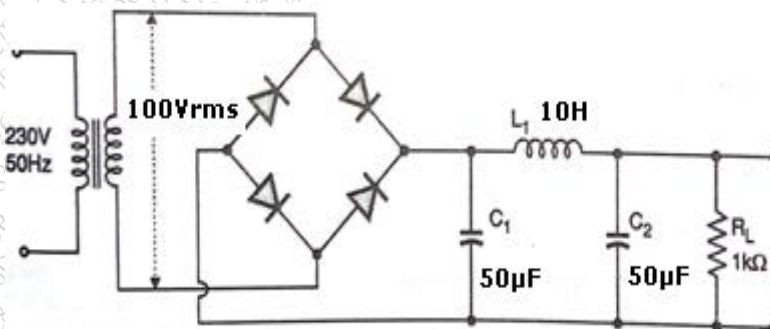


Q.3

- Explain with construction working and characteristic operation of n-channel D-MOSFET. Also compare it with E-MOSFET.
- Calculate dc load voltage, an ac ripple in output and ripple factor.

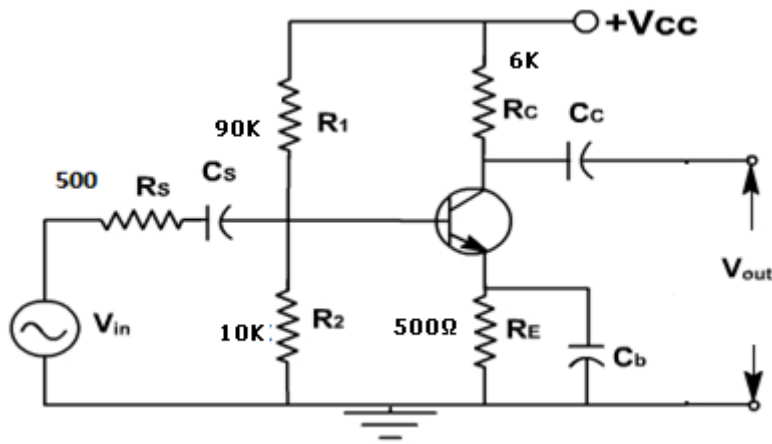
10

10



Q.4

a) Find Z_i , Z_o , A_v and A_{v_s} using Hybrid- π model ($V_{BE}=0.7V$, $\beta=100$) **10**



b) Explain working of Full wave rectifier with LC filter. Also draw output waveforms and derive expression for ripple factor. **10**

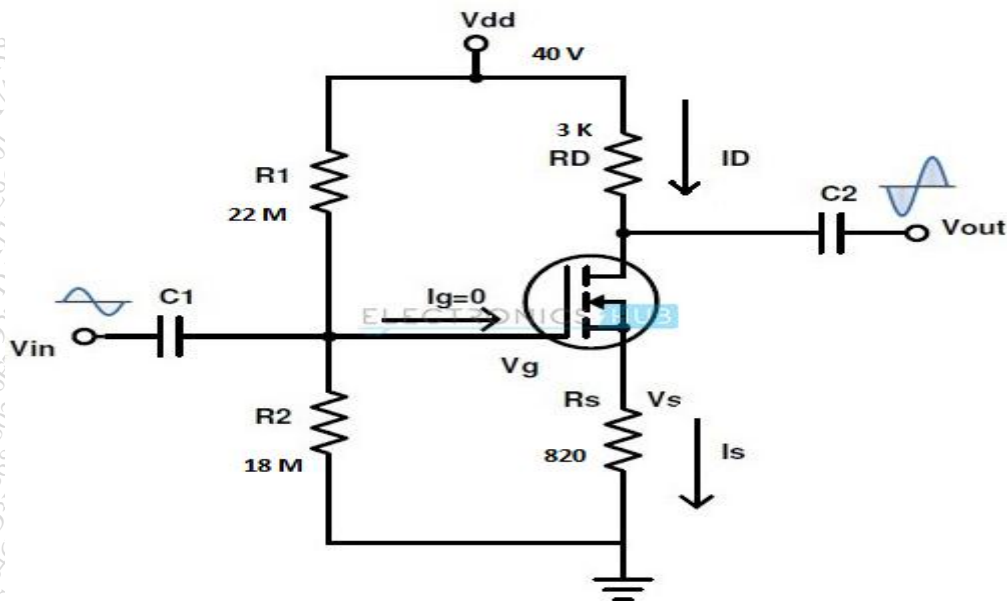
Q.5

a) Design single stage CE amplifier for $A_v \geq 180$, $h_{fe} = 220$, $V_{CC} = 18V$, $h_{ie} = 2.7K$, $S_{ICO} \leq 10$, $f_L \leq 20Hz$, $V_{CE sat} = 1V$, $V_{BE} = 0.7V$, $h_{re} = h_{oe} = 0$ **15**

b) Explain positive and negative clippers. **05**

Q.6

a) Find I_{DQ} , V_{DSQ} and V_{GSQ} if $V_{GS TH} = 5V$, $I_{D ON} = 3mA$ and $V_{GS ON} = 10V$ **10**



b) Compare CE, CB and CC configuration of BJT amplifier. **10**

DBEC DATA SHEET

Transistor type	P _{max} I _{emitter} @ 25°C Watts	I _{emitter} @ 25°C Amps	V _{CE} max volts d.c.	V _{CE} max volts d.c.	V _{CE} max (50μ)	V _{CE} max (50μ) d.c.	V _{CE} max volts d.c.	V _{CE} max volts d.c.	V _{CE} max volts d.c.	T _j max °C	D.C. current			gain			S _{min}	S _{max}	h _{FE} max.	V _{CE} max.	θ _{CH} above 25°C °C/W	θ _{CH} above 25°C °C/W
											min	typ.	max.	min.	typ.	max.						
2N 3053	115.5	15.0	1-1	100	60	70	90	1	200	20	50	70	15	50	120	1.8	1.5	0.7	—	—	—	
ECN 055	30.0	3.0	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	3.5	0.05	—	—	—	
BC147A	0.25	0.1	0.25	90	45	50	—	6	125	115	180	220	125	250	260	0.9	—	—	—	—	—	
2N 555(PNP)	0.225	0.5	0.25	85	30	—	—	—	100	35	—	65	—	45	—	—	—	—	—	—	—	
BC148B	0.25	0.1	0.25	50	45	50	—	6	125	200	290	450	240	330	500	0.9	—	—	—	—	—	

Transistor type	h _{FE}	h _{FE}	h _{FE}
BC 147A	2.7 K Ω	180 Ω	1.5 × 10 ⁻⁴
2N 325 (PNP)	1.4 K Ω	250 Ω	3.2 × 10 ⁻⁴
BC 147B	4.5 K Ω	300 Ω	2 × 10 ⁻⁴
ECN 100	50 Ω	—	0.4°C/W
ECN 149	15 Ω	—	—
ECN 055	12 Ω	—	—
2N 3055	6 Ω	—	—

APP. 11—JFET MUTUAL CHARACTERISTICS														
—V _{GS} 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
I _D 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 _D 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 _D 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 _{GS} max. Volts	V _{GS} min. Volts	V _{DS} max. Volts	I _D max. @ 25°C	T _j max.	I _{SS}	I _{SS} (typical)	-V _{GS} Volts	r _{DS}	Derate	θ _{CH}
2N3822	50	50	50	300 mW	175°C	2 mA	3000 μΩ	6	50 KΩ	2 mW/°C	0.59°C/W
2N3823	50	50	50	300 mW	175°C	2 mA	3000 μΩ	6	50 KΩ	2 mW/°C	0.59°C/W
2N3824	30	30	30	300 mW	200°C	7 mA	5600 μΩ	2.5	50 KΩ	—	0.59°C/W