(3 Hours) **(Total Marks : 80)**

Please check whether you have got the right question paper.

N.B.: **1)** **Question No. 1** is **compulsory**.
2) Solve **any three** questions from the remaining **five** questions.
3) **Figures** to the **right** indicate **full marks**.
4) Assume suitable **data** if **necessary** and **mention the same** in **answer sheet**.

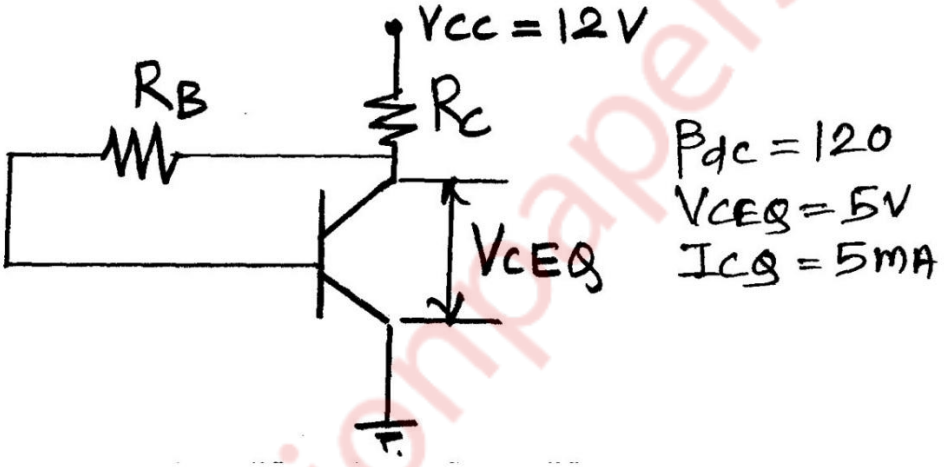
1. Attempt **any Four** questions : **(20)**

a) Explain Various types of Resistors.

b) Give the equation for the current in semiconductor diode. With the help of this equation explain in detail the V-I characteristics of a semiconductor diode.

c) Explain Zener as a Voltage regulator.

d) Find Values for R_B and R_C :



e) Compare BJT CE Amplifier and JFET CS Amplifier.

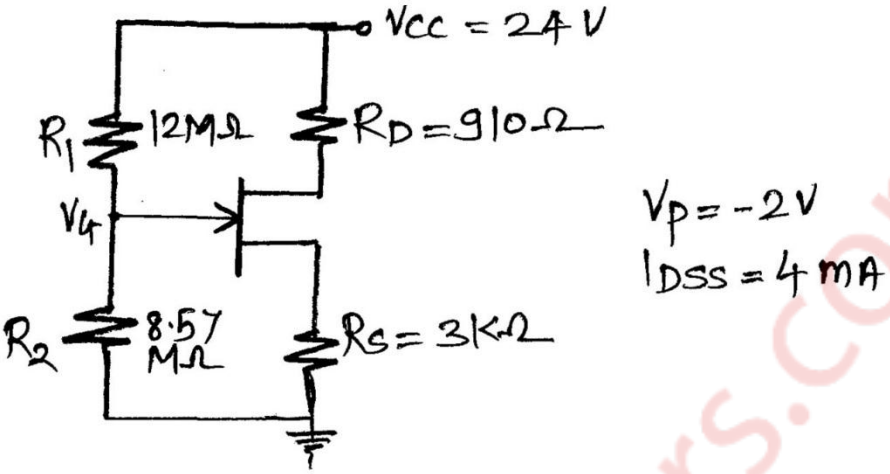
f) Draw and explain high frequency model of BJT for CE configuration.

2. Design a single stage CE amplifier suitable for low frequencies up to 10Hz to give voltage gain Av 70 and the output voltage of 4.5 Volts; employing transistor type BC147A.Calculate the expected Av and maximum output voltage with negligible distortion that can be obtained from the designed circuit. Also, calculate the input resistance of the amplifier. Specify clearly the supply voltage Vcc for the designed circuit. **(20)**

3. a) A dc voltage of 350 Volts with peak ripple voltage not exceeding 5 Volts is required to supply a 500 Ω load. Determine following if inductor filter and full wave rectifier is used **(10)**
1) Inductance required
2) Input voltage required.

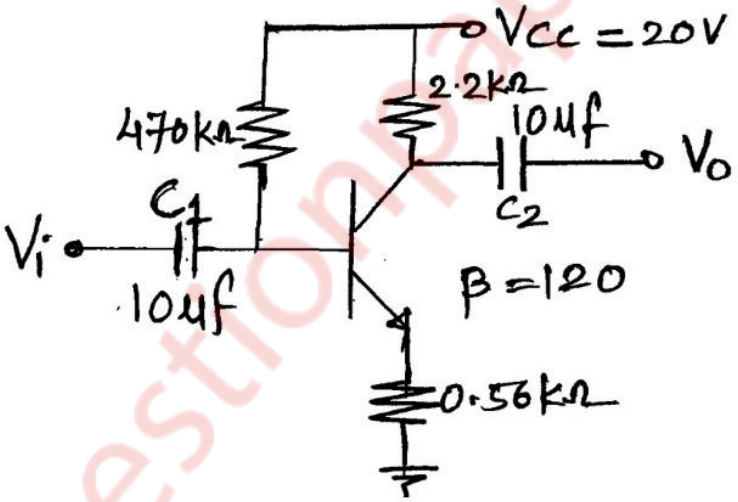
b) Explain and derive the expression for ripple factor for capacitor filter with full wave rectifier. **(10)**

4. a) For the circuit shown below determine I_{DQ} and verify if the FET will operate in pinch off region : **(10)**



b) State and explain Miller theorem. **(10)**

5. a) Determine Zi ,Zo and A v for the circuit shown below : **(10)**



b) Draw small Signal hybrid parameter equivalent circuit for CE amplifier and define the same .What are the advantages of h-parameters? **(10)**

6 Write short note on : **(20)**

a) Hybrid Parameter
b) Regions of operation of FET
c) Stability factor of biasing circuits
d) DC load line concept in BJT. Why Q point should be at the middle of load line and fixed?

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_{CEX} (Sus) volts d.c.	V_{EBO} volts d.c.	V_{BEO} volts d.c.	T_j max °C	D.C. current gain min	typ.	max.	Small Signal min.	typ.	max.	h_{fe}	V_{BE} max.	θ_{j-a} °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	
DC147A	0·25	0·1	0·25	30	45	50	—	6	125	115	180	220	125	220	260	0·9	—	—	
2N 525(PNP)	0·225	0·5	0·35	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 ℧	1·2 × 10^{-4}	—
BC 147B	4·5 K Ω	30μ ℧	2 × 10^{-4}	0·4°C/mw
ECN 100	500 Ω	—	—	—
ECN 149	250 Ω	—	—	—
ECN 055	100 Ω	—	—	—
2N 3055	25 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
Ios 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
Ios 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
Ios 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_{GS} max. Volts	V_{GS} max. Volts	P_t max. @25°C	T_j max.	I_{DSS}	g_{fs} (typical)	$-V_p$ Volts	r_d	Derate above 25°C	θ_{j-a}
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