EXTC - Sem. III - old - EDC - I 27/11/2015

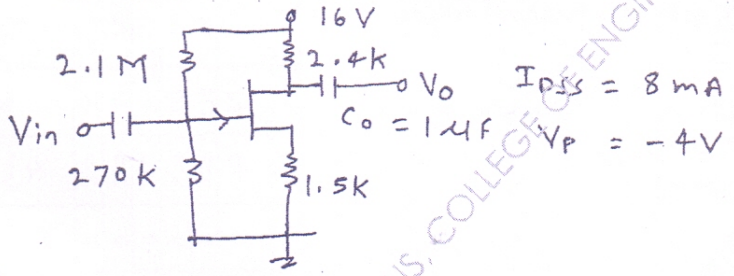
Q.P. Code : **1121**

(Old Course)
(3 Hours) [Total Marks : 100

N.B. : (1) Question **No.1** is **compulsory.**
(2) **Attempt** any **four** questions from the remaining **six** questions.
(3) **Figure** to the **right** indicates **full marks.**
(4) Assume **suitable** data whenever **necessary** and **mention the same.**

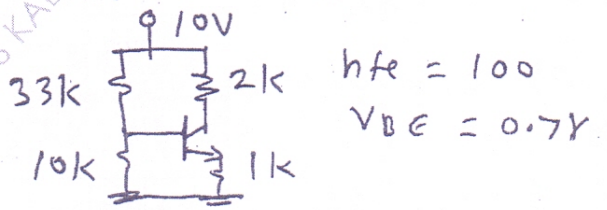
1. Using BC 147 A transistor design single stage RC coupled BJT amplifer for following specifications Av = 100, V_0 = 3 Volts, f_L = 10 H_z, S < 10. For the designed amplifier determine input and output impedances ,voltage gain. State any **two** applications of this amplifier. **20**

2. (a) Derive the expressions of voltage gain ,input impedance, output impedance for CS amplifier using JFET. **10**
   (b) Determine V_{GS}, V_{DS}, I_D for the amplifier shown below : **10**



3. (a) Derive the expressions of Voltage gain, current gain ,input impedance and output impedance for CB AMPLIFIER. **10**
   (b) Explain different biasing methods used for D MOSFET and E MOSFET. **10**

4. (a) Draw the circuit diagram and explain the operation of Bridge rectifier with capacitor filter. Draw neat waveforms for current and voltage across load and diode.State application of this rectifier. **10**
   (b) Find I_{BQ}, I_{CQ} and V_{CEQ} for the following circuit. Draw DC load line. **10**



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QP-Con. 8384-15.

5. Design CS amplifier for the following specifications : 18
$A_v = 10$, $Z_{in} = 1M$ ohms, $V_o = 2$ Volts, $F_L = 10$ Hz
State applications of this amplifier. 2

6. Write short notes on the following : 20
(a) BJT as a switch,
(b) Thermal runaway,
(c) S.C.R.,
(d) Zener diode.

7. (1) Draw and explain hybrid π model of BJT. 5
(2) Explain biasing of FET for zero temperature drift. 5
(3) Explain the operation of BJT shunt voltage regulator. 5
(4) Compare different types of filters. 5

Transistor type	P_{dmax} @ 25°C Watts	I_{cmax} @ 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_{eco} volts d.c.	T_j max. °C	D.C. current gain min.	D.C. current gain typ.	D.C. current gain max.	Small Signal min.	Small Signal typ.	h_{fe} max.	V_{ae} 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	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	–	–	6	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
BC 147A	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	–	–	–	–
BC 147 B	0.25	0.1	0.25	50	45	50	–	6	125	200	290	450	240	330	500	0.9	–	–

Transistor type	h_{ie}	h_{oe}	h_{re}	θ_{ja}
BC 147 A	2.7kΩ	18μmho	1.5×10^{-4}	0.4°C/mW
2N 525 (PNP)	1.4kΩ	25μmho	3.2×10^{-4}	—
BC 147B	4.5kΩ	30μmho	2×10^{-4}	0.4°C/mW
ECN 100	50Ω	–	—	—
ECN 149	15Ω	–	—	—
ECN 055	12Ω	–	—	—
2N 3055	6 Ω	–	—	—

BFW 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_{ds} 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_{ds} 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_{ds} 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 mho	8	50 KΩ	2 mW/°C	0.59°C/mW
BFW 11 (typical)	30	30	30	300 mW	200°C	7 mA	5800 μ mho	2.5	50 KΩ	—	0.59°C/mW