S.E. Sem 3 (Rev.) EXTC / Electronics I 21/5/08

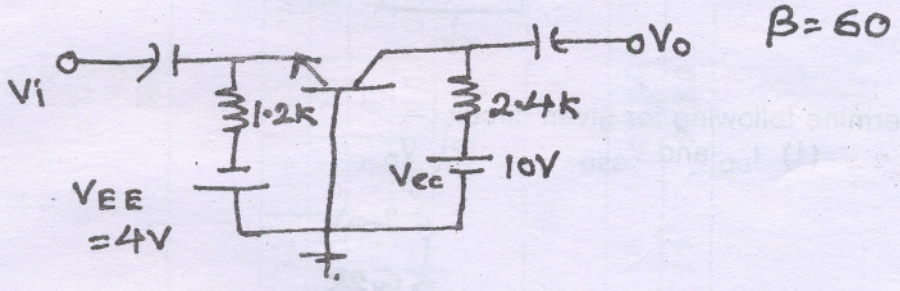
Con. 2600-08. CO-9598

(REVISED COURSE)

(3 Hours) [Total Marks : 100

N.B. (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** out of remaining **six** questions.
(3) Assume **suitable data** wherever **required** and justify the **same**.

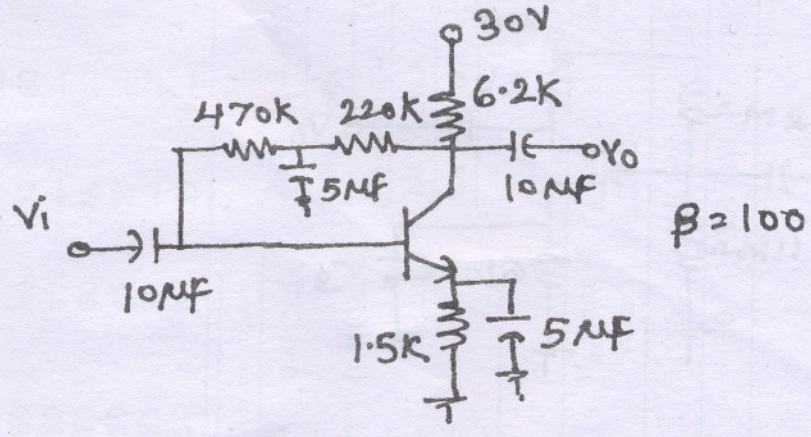
1. (a) Compare—Clipper and Clamper circuits. 5
(b) Explain photodiode construction, working and application. 5
(c) Determine voltage V_{CB} and current I_B for given circuit. 5



(d) Draw the circuit diagram of series regulator. Derive expression for line regulation. 5

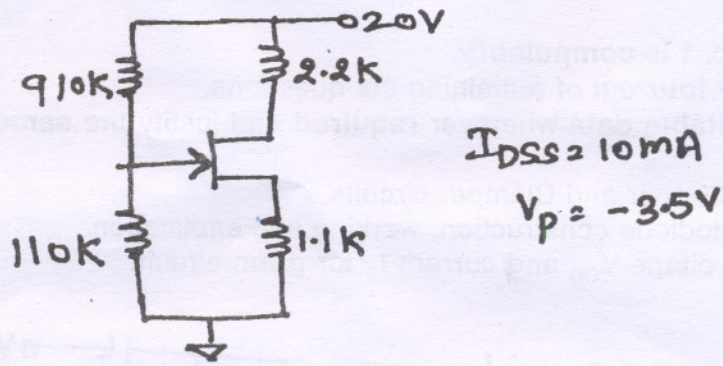
2. Design a single stage CE amplifier for low frequency range 20 Hz to 20KHz to give voltage gain $A_V \geq 60$ with stability factor $S \leq 9$ and output voltage 2·3 V. Use BC147B. Specify V_{CC} required. Calculate A_V, R_i, R_0 of designed circuit. 20

3. (a) Explain term stability factor. Derive expression for stability factor for voltage divider bias circuit of BJT. 12
(b) For the circuit given below calculate :— 8
(1) I_C (2) V_C (3) V_{CE}



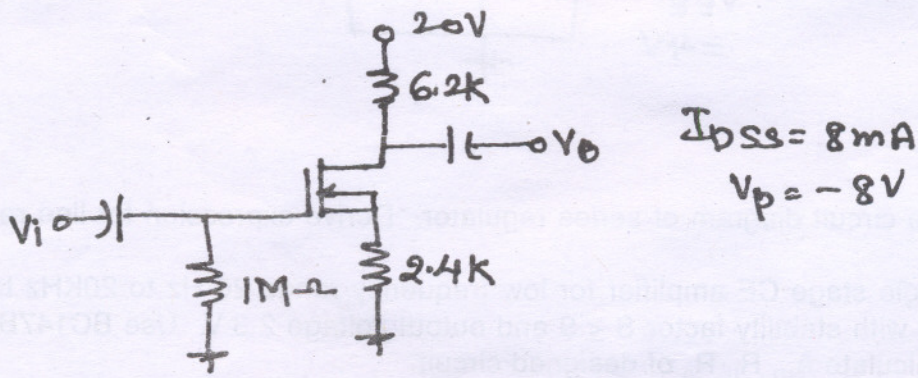
4. Design a single stage RC coupled CS amplifier using BFW11 to meet following specifications. 20
$|A_V| = 9$ output voltage $V_0 = 2·5$ V(rms)
With biasing circuit to give
(a) Zero temperature draft
(b) To operate FET at $I_{DQ} = \frac{I_{DSS}}{2}$.

5. (a) Determine I_{DQ} V_{GSQ} and V_{DSQ} for given circuit. 10



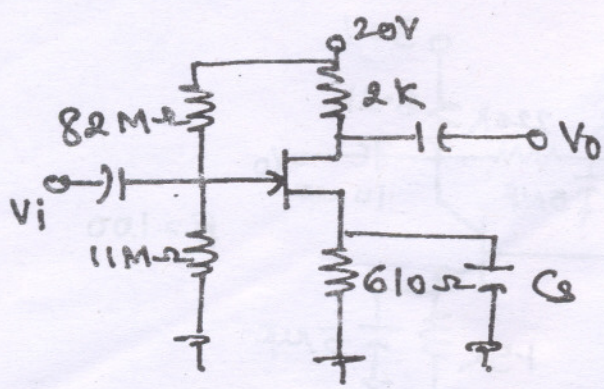
(b) Determine following for given circuit :— 10

(1) I_{DQ} and V_{GSQ} (2) V_D



6. (a) Draw a circuit diagram of JFET voltage divider bias circuit. Draw a.c. equivalent circuit and derive expression for A_V, Z_i, Z_O. 10

(b) Determine Z_i, Z_o and V_o for circuit shown if V_i = 20 mV. 10



I_{DSS} = 12 mA, V_P = − 3V γ_d = 100 KΩ.

7. Write short notes on :— 20

(a) Working of SCR and its characteristics.

(b) Depletion type MOSFET and its biasing circuits.

DBEC DATA SHEET

sistor 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.	0_{fe} °C/W	Derate above 25°C W/°C
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
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
149	30·0	4·0	1·0	50	40	—	—	8	150	30	50	110	33	60	115	1·2	4·0	0·3
100	5·0	0·7	0·6	70	60	65	—	6	200	50	90	280	50	90	280	0·9	35	0·05
47A	0·25	0·1	0·25	50	45	50	—	6	125	115	180	220	125	220	260	0·9	—	—
25(PNP)	0·225	0·5	0·25	85	30	—	—	—	100	35	—	65	—	45	—	—	—	—
47B	0·25	0·1	0·25	50	45	50	—	6	125	200	290	450	240	330	500	0·9	—	—

sistor type	hie	hoe	hre	θja
147A	2·7 K Ω	18μ ℧	1·5 × 10⁻⁴	0·4°C/mw
25 (PNP)	1·4 K Ω	25μ ℧	3·2 × 10⁻⁴	—
147B	4·5 K Ω	30μ ℧	2 × 10⁻⁴	0·4°C/mw
100	500 Ω	—	——	——
149	250 Ω	—	——	——
055	100 Ω	—	——	——
055	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
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

hannel *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_{mo} (typical)	$-V_P$ Volts	r_d	Derate above 25°C	θ_{ja}
22	50	50	50	300 mW	175°C	2 mA	3000 μ ℧	6	50 KΩ	2 mW/°C	0·59°C/mW
11 (typical)	30	30	30	300 mW	200°C	7 mA	5600 μ ℧	2·5	50 KΩ	——	0·59° C/mW