V-Ex-I-09-E-Scan-59 S.E. (ETRX) Sem III (CR) 15-5-09

Basic of Electronic Circuits 3 p.m. to 6 p.m.

Con. 2685-09. **VR-3300**

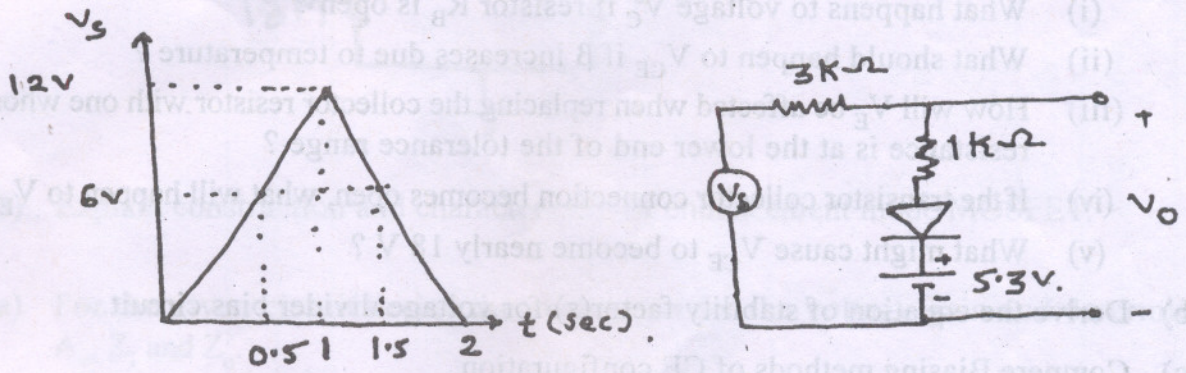
(REVISED COURSE)

(3 Hours) **[Total Marks : 100**

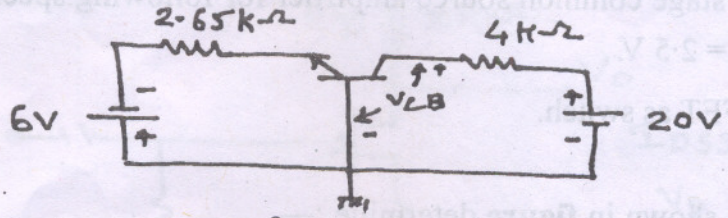
N.B. : (1) Question No.1 is **compulsory**.
(2) Attempt any **four** out of remaining **seven** questions.
(3) Assume **suitable data** wherever **required** and **justify** the **same.**

1. Attempt any **four** :— **20**

(a) Sketch the output voltage V_o in the following circuit for the variable input voltage V_s. Assume $V_y = 0{\cdot}7$ V.

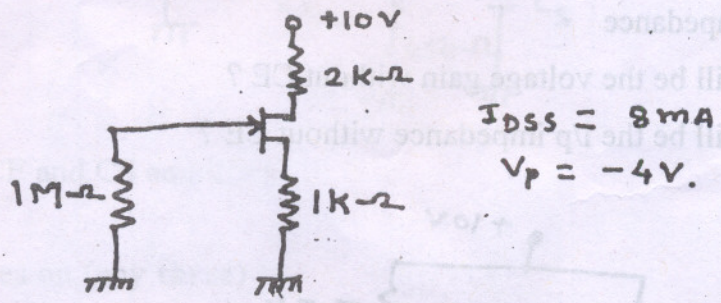


(b) Draw D.C. load line for below circuit.



(c) Derive the relation $\alpha = \dfrac{\beta}{\beta + 1}$.

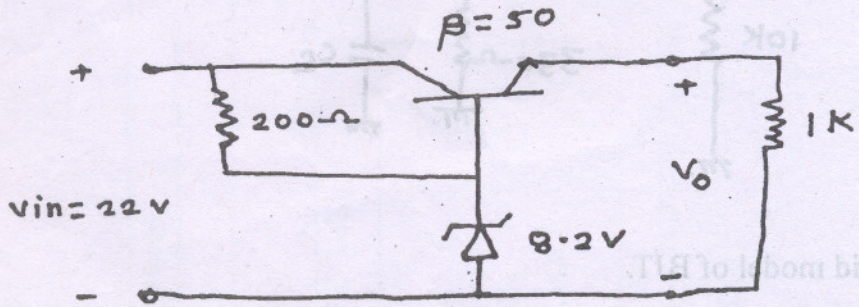
(d) Sketch the d.c. load line.



(e) Explain necessity of Biasing for BJT Amplifier.

2. (a) Explain Bridge rectifier circuit and derive the formula for ripple Factor, TUF and efficiency of rectification. 14

(b) Determine output voltage and zener current for following circuit. 6



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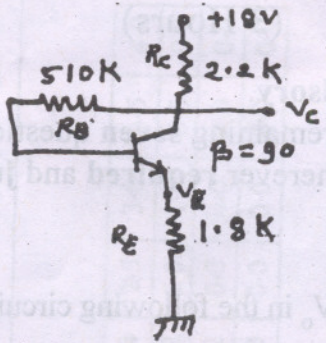
3. (a) Answer the following questions for the given circuit. **10**



(i) What happens to voltage V_C if resistor R_B is open ?

(ii) What should happen to V_{CE} if β increases due to temperature ?

(iii) How will V_E be affected when replacing the collector resistor with one whose resistance is at the lower end of the tolerance range ?

(iv) If the transistor collector connection becomes open, what will happen to V_E ?

(v) What might cause V_{CE} to become nearly 18 V ?

(b) Derive the equation of stability factor(s) for voltage divider bias circuit. **6**

(c) Compere Biasing methods of CE configuration. **4**

4. (a) Design single stage common source amplifier for following specifications. **16**
$A_V = -25$, $V_o = 2{\cdot}5$ V.

(b) Explain MOSFET as switch. **4**

5. (a) For the circuit shown in **figure** determine :— **15**

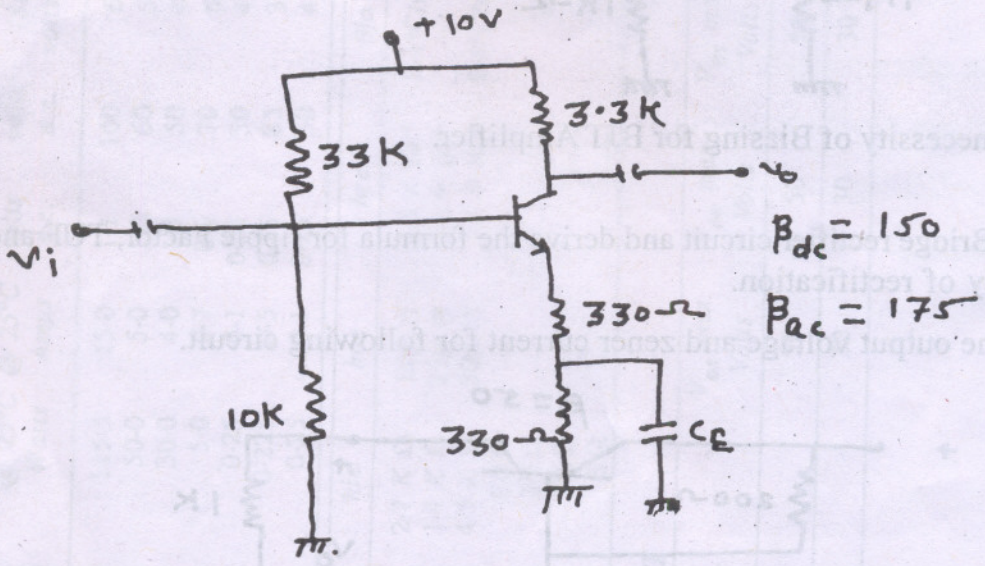
(i) Operating point

(ii) Voltage gain

(iii) Input impedance

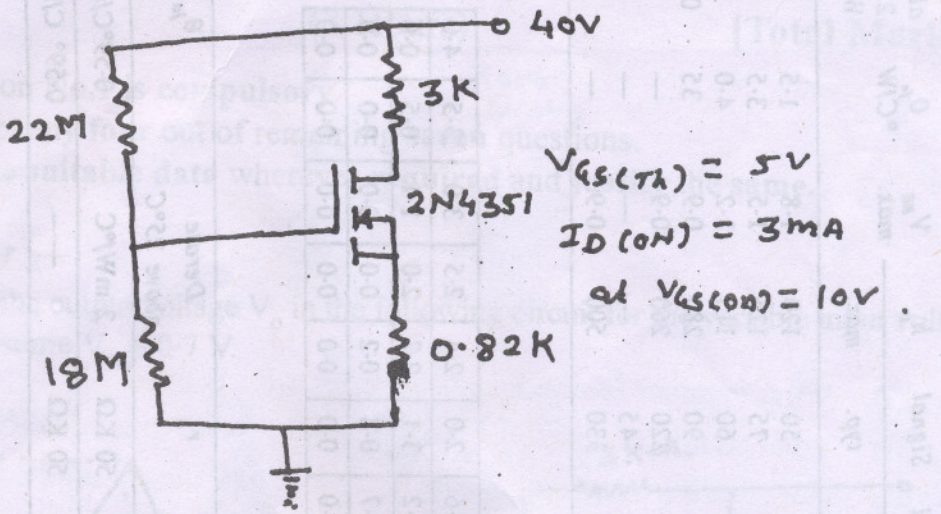
(iv) What will be the voltage gain without CE ?

(v) What will be the i/p impedance without CE ?



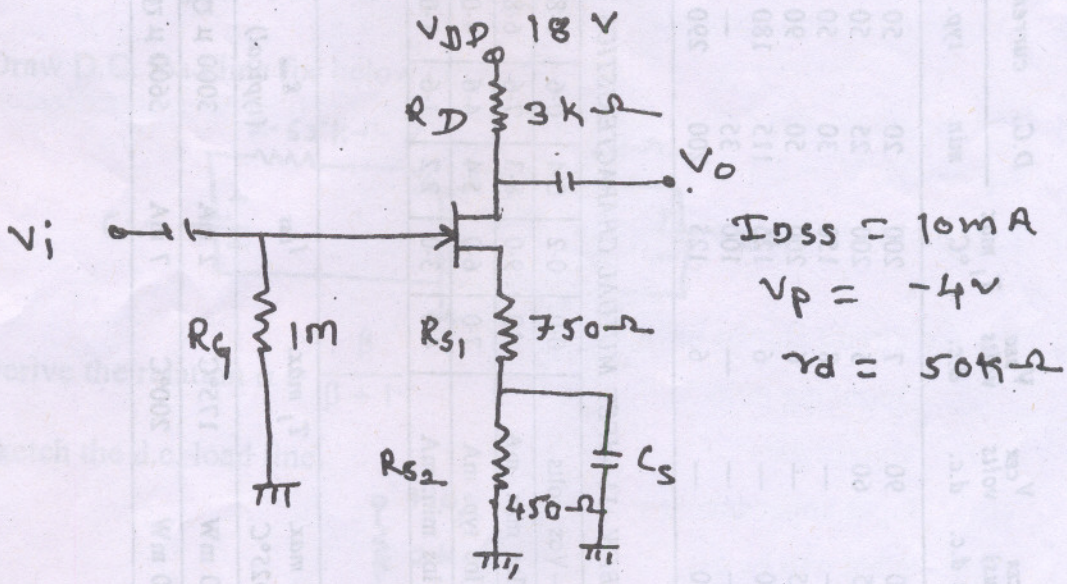
(b) Explain hybrid model of BJT. **5**

6. (a) Determine I_{DQ}, V_{GSQ} and V_{DS} for given network. 12



(b) Explain construction and characteristics of enhancement mode MOSFET. 8

7. (a) For the given circuit derive the expression for the voltage gain and determine A_v, Z_i and Z_o. 16



(b) Compare CE and CS amplifier. 4

8. Write short notes on (any **three**) :— 20

(a) Photo diodes and Photo voltaic cells.

(b) Switching characteristics of BJT.

(c) Voltage Multiplier.

(d) Bias compensation.

DBEC DATA SHEET

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_{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.	θ_{fc} °C/W	Derate above 25°C W/°
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·
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·
ECN 149	30·0	4·0	1·0	50	40	—	—	8	150	30	50	110	33	60	115	1·2	4·0	0·
ECN 100	5·0	0·7	0·6	70	60	65	—	6	200	50	90	280	50	90	280	0·9	35	0·0
BC147A	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	—	—	—	—
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 ʊ	1·5 × 10^{-4}	0·4°C/mw
2N 525 (PNP)	1·4 K Ω	25μ ʊ	3·2 × 10^{-4}	—
BC 147B	4·5 K Ω	30μ ʊ	2 × 10^{-4}	0·4°C/mw
ECN 100	50 Ω	—	——	——
ECN 149	15 Ω	—	——	——
ECN 055	12 Ω	—	——	——
2N 3055	6 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

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_{mo} (typical)	$-V_P$ Volts	r_d	Derate above 25°C	θ_{ja}
2N3822	50	50	50	300 mW	175°C	2 mA	3000 μ ʊ	6	50 KΩ	2 mW/°C	0·59°C/m
BFW 11 (typical)	30	30	30	300 mW	200°C	7 mA	5600 μ ʊ	2·5	50 KΩ	——	0·59° C/m