Principles of Electronics (EC- 1304)
END semester examination – 2014
(BTech 3rd semester, EE)

Time: 3:00 Hrs. **Max Marks: 60**

Note: Do any TEN questions. All questions carry equal marks.

Q.1 Perform the following mathematical operations:-

a) $(44)_{10}+(24)_{10}=(\ )_{10}$ using 9's complement.

b) $(19)_{10}-(49)_{10}=(\ )_{2}$ using 1's complement.

c) (i) convert $(100110111)_2$ in Gray Code number and (ii) convert Gray code number 1001001101 in Binary number system.

Q.2 Find the min-term expansion of $f(A,B,C,D)=\bar{A}(\bar{B}+D)+AC\bar{D}$

(Hint: In the range of 0-15).

Q.3 For the given Boolean expression $f(A,B,C,D)=(\bar{A}+B).\bar{C}.(1+D+0.\bar{E})$,

Find (a) Dual Function (f_D) and (b) Complement Function $(\bar{f})$.

Q.4 The differential input operational amplifier shown in Figure Q.4 consists of a base amplifier of infinite gain. Terminals 1 and 2 are inverting and non-inverting, respectively. Find the output voltage expression

Q.5 Draw and explain the (a) OPAMP Logarithmic amplifier and (b) OPAMP Multiplier circuit (for two input signals only)

Q.6 Draw and explain the hybrid parameter model of a BJT transistor with suitable diagrams. Also, draw and explain the simplified *h*-parameter model. (Detailed derivations are NOT necessary)

Q.7 For the self bias FET circuit shown in the Figure Q.7 below, Determine I_{DQ}, V_{GSQ}, and V_{DSQ}. (Given $I_{DSS}=10\,mA$ and $V_P=-4\,V$)

Q.8 Derive an expression for the r_{ON} (ON state resistance) of a FET for small drain-to-source voltage. (Consider the common notations used in the class for representing different parameters).

Q.9 Determine the range of R_L and I_L that will result in V_{R_L} being maintained at 10 V consider the circuit shown in Figure Q.9.

Q.10 Write short notes on (around 100 words for each, DO ANY FOUR)

(a) Enhancement-type MOSFET

(b) Cathode ray oscilloscope (CRO)

(c) Function generator

(d) Base width modulation or Early effect

(e) Diode: Transition capacitance (C_T), and Diffusion capacitance (C_D)

(f) Ideal Operational Amplifier (OPAMP)

1 Derive the expression for the ripple factor of a bridge-type full wave rectifier. Find the peak inverse voltage (PIV) across each of the diodes in the above full wave rectifier.

Q.12 Design a clamper to perform the function shown in the Figure Q.12 shown below

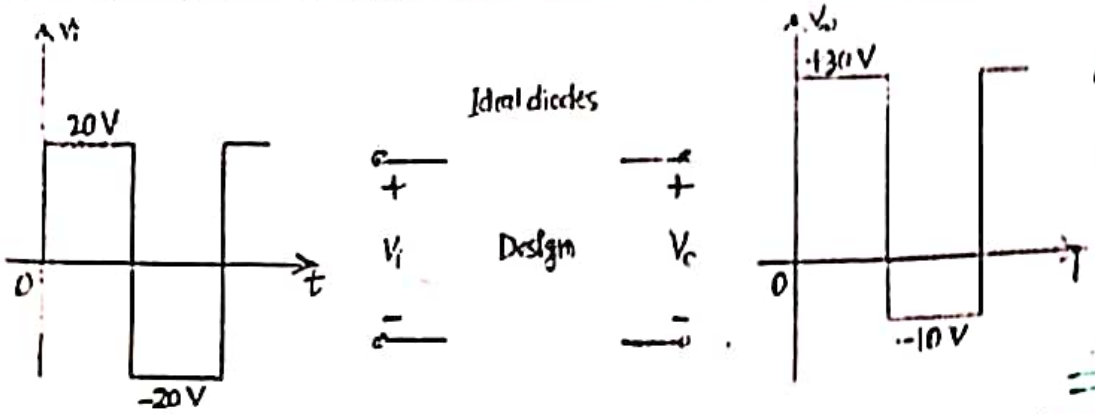

Figure Q.12

Q.13 Determine the DC bias voltage V_{CE} and the current I_C for the voltage divider BJT circuit shown below in Figure Q.13. Given: $\beta = 140$

Problem Figures

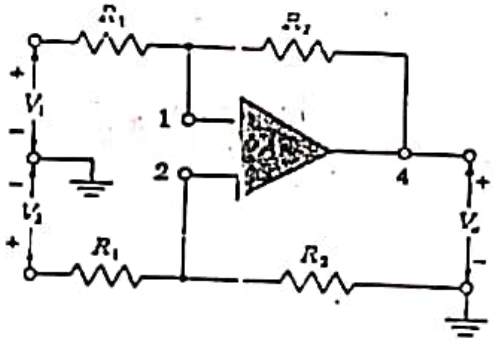

Figure Q.4

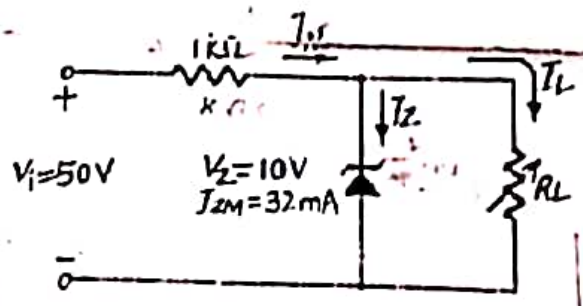

Figure Q.9

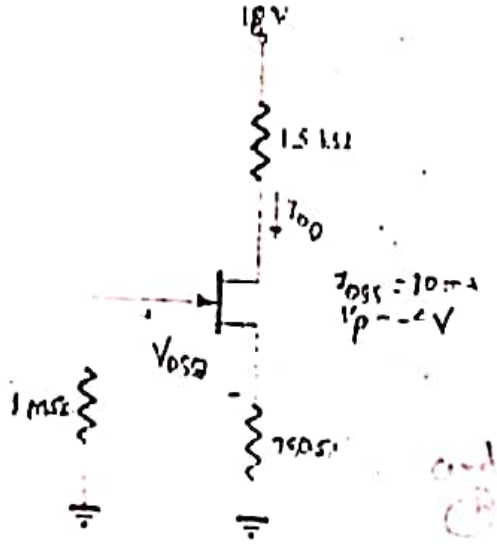

Figure Q.7

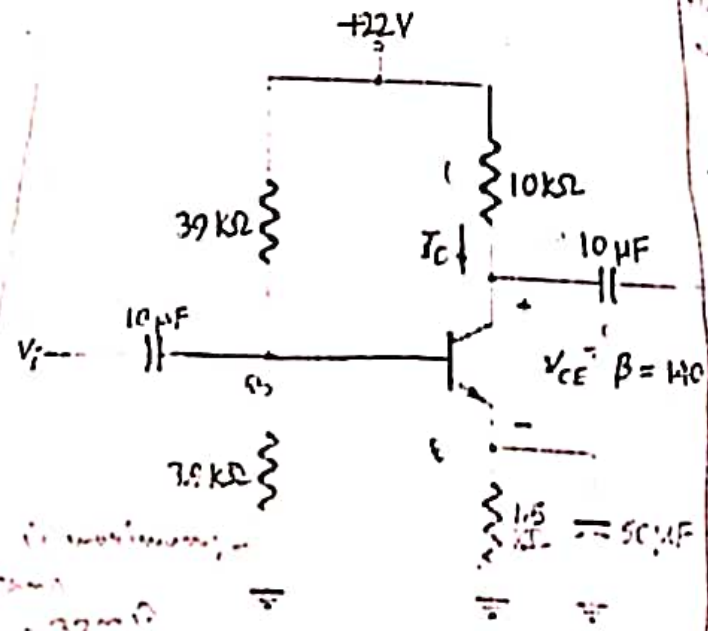

Figure Q.13