DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING, NIT, HAMIRPUR

End Term Examination **Time: 120 Min.** **Max Marks: 50**
Class: B. Tech. 1st Year **March 2021** **Course: Basic Electronics (EC- 101)**

Note – Answer all Questions.

I Discuss two port Devices and the H-parameters. Give a detailed ac Analysis on Small- Signal Low-Frequency Common-Emitter Transistor Amplifier. (12)

II (a) Explain Tunnel Diode and its characteristic. (6x2)

(b) If resistivity of pure Silicon is 3000Ωm and the electron and hole motilities are $0.12m^2v^{-1}s^{-1}$ and $0.045m^2v^{-1}s^{-1}$ respectively, determine. The resistivity of a specimen of the material when 10^{19} atoms of phosphorous are added per m^3 given $e=1.6\times10^{-19}c$, p=3000Ωm, $\mu_e=0.12m^2v^{-1}s^{-1}$, $\mu_h=0.045m^2v^{-1}s^{-1}$.

III (a) A voltage of 200 cos ωt is applied to Half Wave Rectifier with load resistance of 5 kW,: (6x2)
Find the followings
(i) Maximum DC Current Component, (ii) RMS Current, (iii) Ripple Factor (iv) TUF (v) Rectifier Efficiency.

(b) Discuss clipping circuits. Do mention the differences between inductive and capacitive filter.

IV (a) For the emitter stabilised biased circuit given in Figure-1, Determine the following (7x2)
(i) I_{BQ} (ii) I_{CQ} (iii) V_{CEQ} (iv) V_C (v) V_B (vi) V_E

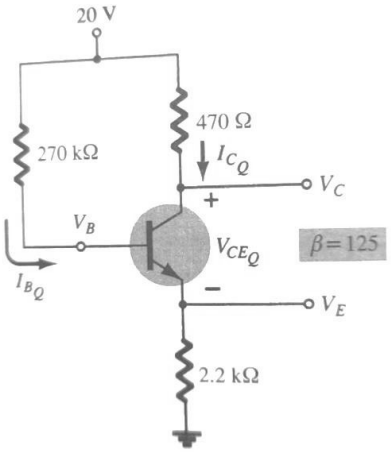

Figure-1

(b) Determine the following for the network given in Figure-2

(i) S (I_{CO}) (ii) S (V_{BE}) (iii) Determine the net change in Ic if a change in operating conditions results in I_{CO} in increasing from 0.2 micro-ampere, V_{BE} drops from 0.7 V to 0.5 V, and β increases 25%.

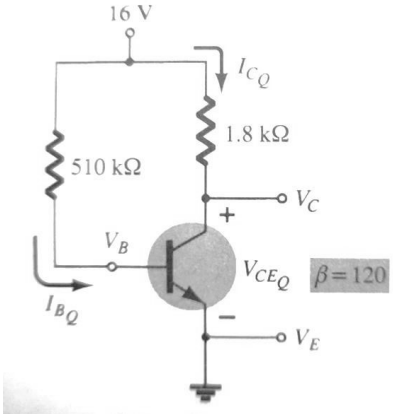

Figure 2

03/12/17
(E)

B-2 and B-3
IIIT, Una

Dr. Shweta Chauha

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Name: Roll No:

National Institute of Technology Hamirpur (HP)
Name of Examination: End-Semester Examination,B.Tech- Nov. / Dec., 2017

Branch : Electronics & Communication Engineering.
Course Name :Basic Electronics Engineering
Semester :1st
Course Code :ECD-114

Time : 3 Hours Max Marks : 60

Note: 1. All questions are compulsory.
2. Symbols are having usual meanings.
3. Assume necessary data if necessary.

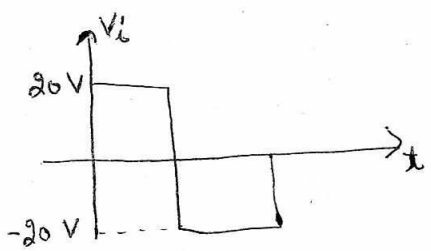
Q.1 (a) Explain the working of Photodiode. (2)

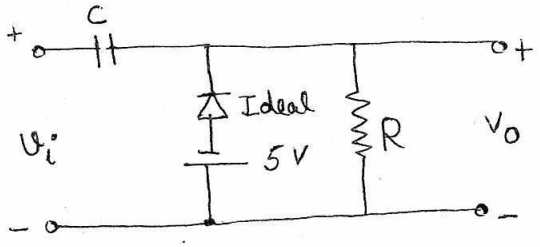
(b) A half wave rectifier uses a diode with an equivalent forward resistance of 0.3 Ω. If the inputac volatge is 10V(rms) and the load is a resistance of 2.0Ω, calculate I_{dc} and I_{rms} in the load. (2)

(c) What is the concentration of holes in Si crystals having donor concentration of $1.4* 10^{24}$ /cm^3 when the intrinsic carrier concentration is $1.4* 10^{18}$ /cm^3? Find the ratio of electron to hole concantration. (2)

(d) The intrinsic carrier concentration for silicon at room temperature is $1.5* 10^{10}$ /cm^3. If themobilities of electron and holes are 1,300 cm^2/Vs and 450cm^2/Vs respectively, what is the conductivity of the silicon (intrisic) ? if silicon is doped with 10^{18} boron atoms per cc, what is its conductivity? (2)

(e) Determine the output waveform for the circuit shown below (2)





Q.2 (a) What are the Barkhausen conditions of oscillations in electronic systems? What are their significance ? (4)

(b) Draw the circuit diagram of a two stage RC coupled amplifier using transitor and also explain the advantage ,disadvanatge and frequency response of RC coupled amplifier. Why we prefer decibel scale to express the gain of an amplifier? (6)

Q.3 (a) Explain the merits and demerits of negative feedback in amplifier? (5)

(b) Explain the construction, working ,characterstics and paramteres of N-channel JFET. (5)

(d) State and Explain the hybrid eqvivalent circuit of a CE transitor and also derive current gain, voltage gain, input resistance and power gain in CE transistor amplifier using h-parameters. (5)

(e) Explain FIXED BIAS CIRCUIT. Inspite of its simplicity,is not much used in amplifiers. why ? (5)

Q.4 (a) Explain the difference between avlanache and zener breakdown. (2)

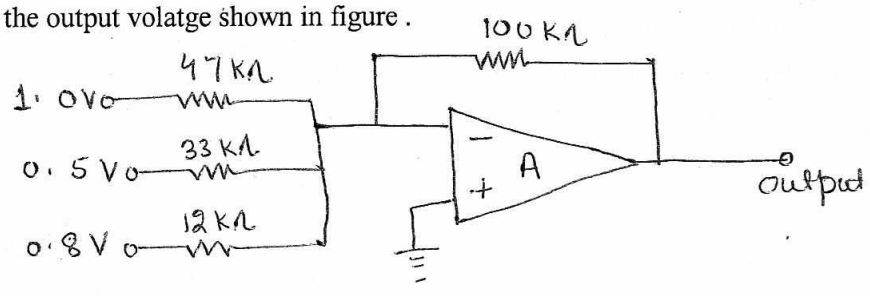
(b) How zener diode can be used as voltage regulator? (4)

(d) Explain the thermal runaway in transitor? (2)

(e) Difference between BJT and FET (2)

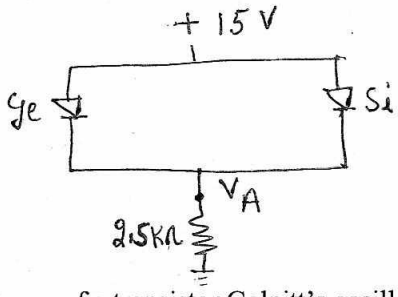
Q.6 (a) Write all the characteristics of ideal operational amplifier. (2)

(b) Determine the output volatge shown in figure . (2)



(c) Derive equation $I_C=\beta i_b+(\beta+1)I_{CO}$. Explain different terms used in them. (2)

(d) Determine the volatge shown in V_A shown in figure (2)



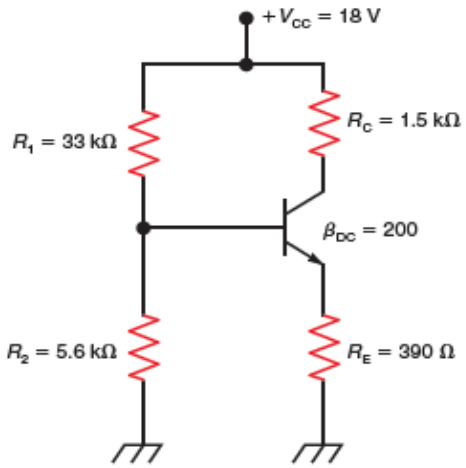
(e) Find the operating frequency of a transistor Colpitt's oscillator if C1=30pF, C2=60pFand L=10μH. (2)

National Institute of Technology Hamirpur

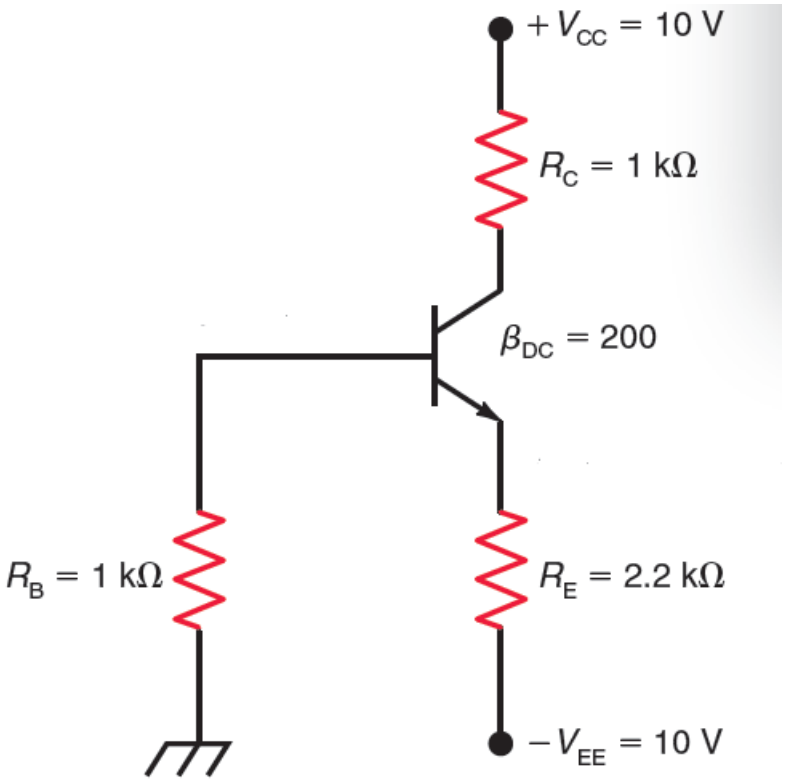
B.Tech First Semester (Section E) End Sem Examination (March 2022)

Total Marks: 50 Time: 2:30-4:30 PM

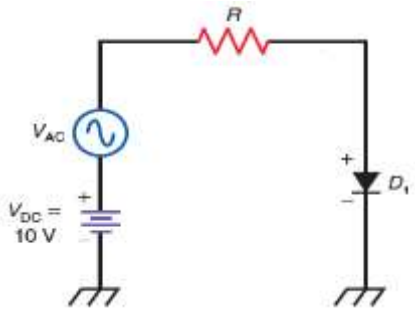
1. For the following transistor bias circuit find the V_B, V_C, V_E, I_C, and V_{CE}. Further also find $I_{C(sat)}$, and $V_{CE(off)}$. Finally, construct a DC load line showing the coordinates of Q point and end of the load lines. **(7)**



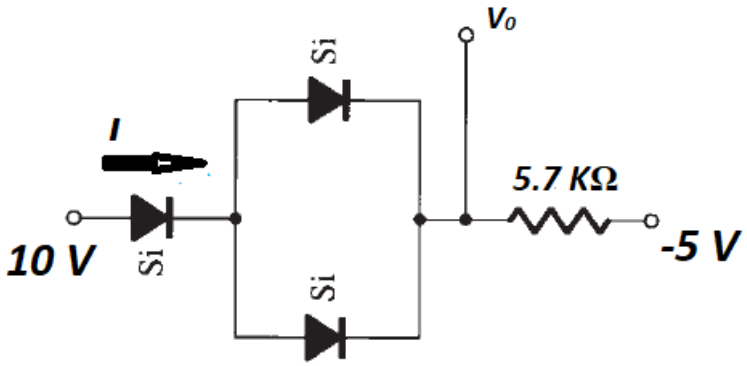
2. For the following circuit find the values of I_E and V_C. **(6)**



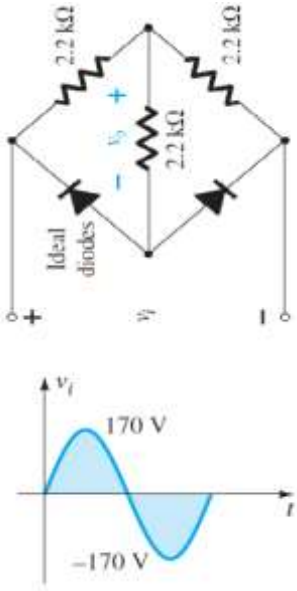
3. For the following circuit calculate the AC resistance, r_{AC}, of the diode for the following values of ***R***: (a) 10 kΩ (b) 5 kΩ, and (c) 1 kΩ. **(6)**



4. Determine the voltage ***V_0*** and current ***I*** marked in the following figure. **(4)**



6. Draw the equivalent circuits for positive and negative half cycles of the input voltage. Further draw the output voltage waveform ***v_0*** and determine the average output voltage. **(6)**



7. Draw hybrid equivalent model of BJT. Further for fixed bias configuration of the BJT, derive the expressions for input impedance, output impedance, voltage gain, and current gain. **(7)**

8. With clear diagrams explain the characteristics a junction field effect transistor. **(4)**

9. With a valid diagram discuss different current components of a BJT. **(4)**

10. With valid diagrams explain the BJT common emitter input and output characteristics. **(6)**