Ref. No. **Ex/PG/LST/T/124A/2018**

Master of Laser Technology Examination, 2018

(1st Semester)

Laser Electronics

Time : Three hours **Full Marks 100**

Answer Any Five

1). Write short notes on (any two) (10+10)

a) Tank circuit oscillation

b) UJT

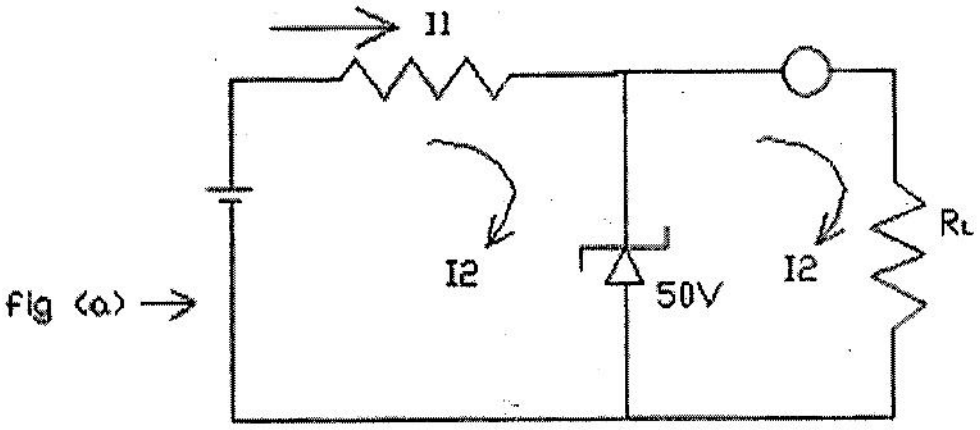
c) Diac

d) BJT and Gain Bandwidth Product

2). (i) Describe with a diagram the two transistor model of a thyristor (8+6+6)

(ii) A Ge transistor with $\alpha = 0.98$ gives reverses saturation $I_{co} = 12\mu A$ when used in CB mode. When the transistor is considered in CE mode with $I_B = 0.2mA$, Calculate I_c.

(iii) The avalanche diode shown in fig. (a) regulates at $50V$ from 5 to $40mA$ current. The output voltage V is $200V$.



(a) Calculate R to allow voltage regulation from $I_L = 0$ to $I_L = I_{L\max}$. What is $I_{L\max}$?

(b) If R is set an above but I_L is fixed at $25mA$, then what is the permissible range of V ?

3). (i) Describe n-channel power MOSFET showing (a) circuit symbol and (b) its basic structure. (10)

(ii) Explain chopper circuit with a circuit diagram and the switching frequency and also show how average output voltage can be regulated. Show the output curve. (10)

4). (a) Describe the operation of Insulated Gate Bipolar Transistor (IGBT) with a basic structure. (10)

(b) Define forced commutation in a thyristor. Describe anyone forced commutation circuit with a suitable diagram. (10)

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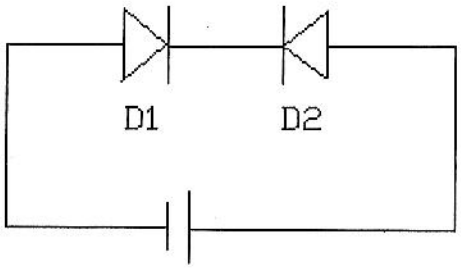
5). (a) Explain McMurray inverter with a circuit diagram. (10)

(b) Two Ge diodes are connected in series opposition across a $5V$ battery as shown in fig. (6+2+2)

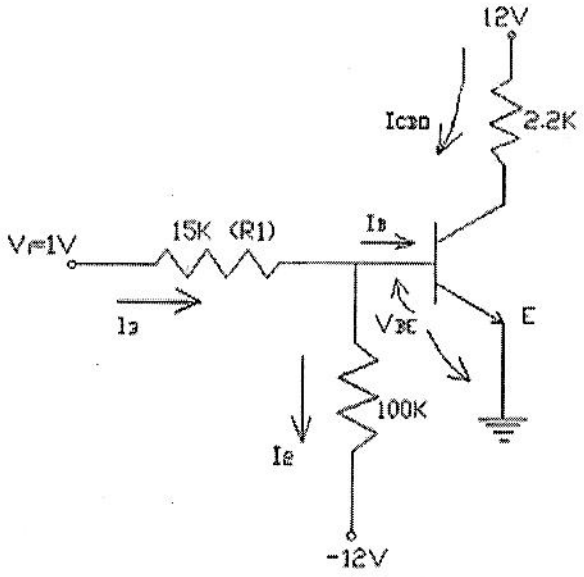


(a) Find the voltage across each diode assuming break down voltage of diode is greater than 5V.

(b) What is the effect of temperature?

(c) Find current if $V_2 = 4.9V$ and $I_0 = 5\mu A$

6). (a) If the silicon transistor used in the circuit shown has a minimum value of $\beta = h_{FE}$ of 30, and $I_{CBO} = 10nA$ at 25^0C (6+6)



(i) Find the V_0 for V_i=12V and

(ii) If R_1=15V and V_i=1V, Find V_0 and show that the transistor is in cut off.

(b) State the difference between BJT and JFET. (8)

7. (i) Describe VI characteristics of a thyristor by drawing curves and labelling the points (5)

(ii) Discuss the use of LC filter on DC output. (5)

(iii) Discuss the application of chopper circuit and SCR circuit. (5)

(iv) Draw and discuss Schottky diode. (5)