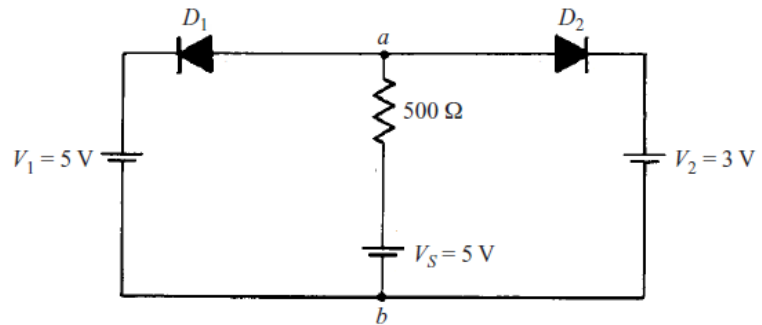




**Question one:****(8 Marks)****Answer the questions****(4 Marks each)****a) In the circuit below,  $D_1$  and  $D_2$  are Si diodes. Find  $I_{D1}$  and  $I_{D2}$ .****b) A Si diode has a saturation current  $I_s = 10 \text{ nA}$  at  $T = 308\text{K}$ .****(1) Find the forward current  $I_D$  if the forward drop  $V_D$  is 0.5 V.****(2) This diode is rated for a maximum current of 5 A. What is its junction temperature at rated current if the forward drop is 0.7 V.**

**Question two:**

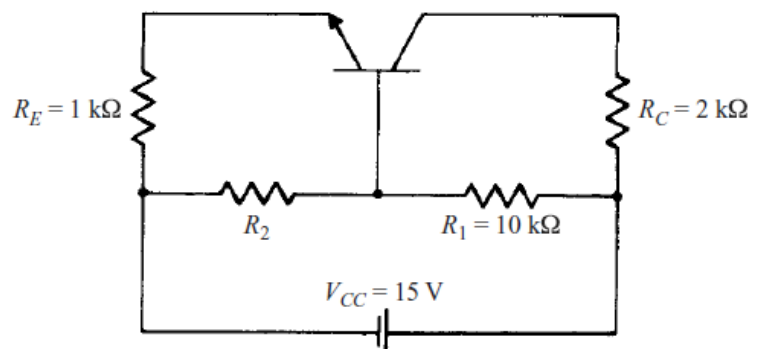
**(8 Marks)**

**(4 Marks each)**

**a)** BJT transistor has  $\alpha = 0.98$  and a base current of  $30\mu\text{A}$ . Find  $\beta$ ,  $I_c$  and  $I_E$ .

**b)** The circuit of Figure below illustrates a method for biasing a transistor using a single dc source. The transistor is a Si device  $\beta=99$ , and  $I_{BQ}=30\mu\text{A}$ .

**Find  $R_2$ , and  $V_{CEQ}$ .**



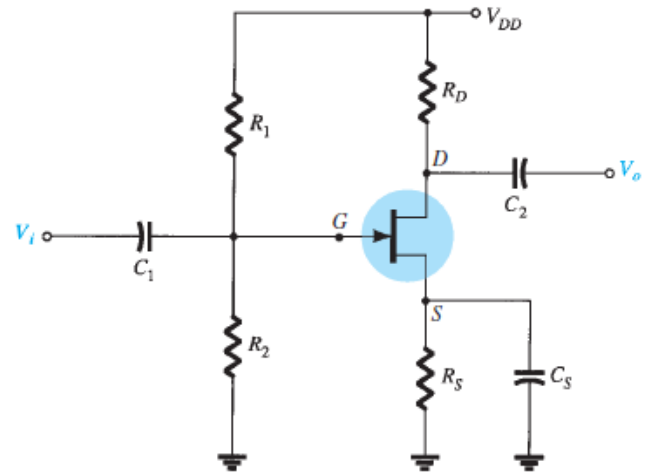
**Question three:****(9 Marks)**

For the circuit below/

$R_1$	$R_2$	$R_D$	$R_S$	$V_{DD}$	$I_{DSS}$	$V_p$
910 k $\Omega$	110 k $\Omega$	2.2 k $\Omega$	1.1 k $\Omega$	20 V	10 mA	- 3.5 V

**a) Find** ..... **(1 Mark each)**

1.  $V_G$
2.  $I_{DQ}$
3.  $V_{GSQ}$
4.  $V_D$
5.  $V_S$
6.  $V_{DSQ}$



**b) Discuss the effect of  $R_S$  on  $I_{DQ}$  and  $V_{GSQ}$  If the value of  $R_S$  becomes a half ( $R_S = 0.55 \text{ k}\Omega$ ).**

**(3 Marks)**

**Question four:**

**(9 Marks)**

For the circuit below, **find/**

**(1.5 Marks each)**

1. Write the name of device .....

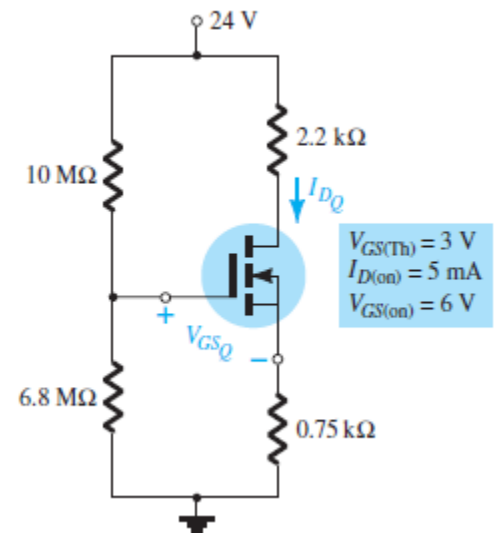
2. The type of biasing is .....

3.  $I_{DQ}$

4.  $V_{GSQ}$

5.  $V_D$

6.  $V_S$



**Question five:****(6 Marks)**

*Design and draw the circuit of a voltage-divider bias network using a depletion-type MOSFET with  $I_{DSS} = 6 \text{ mA}$  and  $V_P = -3 \text{ V}$ , to have a Q-point at  $I_{DQ} = 2 \text{ mA}$ , using a supply of  $18 \text{ V}$ . In addition, set  $V_G = 4 \text{ V}$  and use  $R_D = 2.2 \text{ k}\Omega$ ,  $R_S$ , with  $R_1 = 10 \text{ M}\Omega$ .*

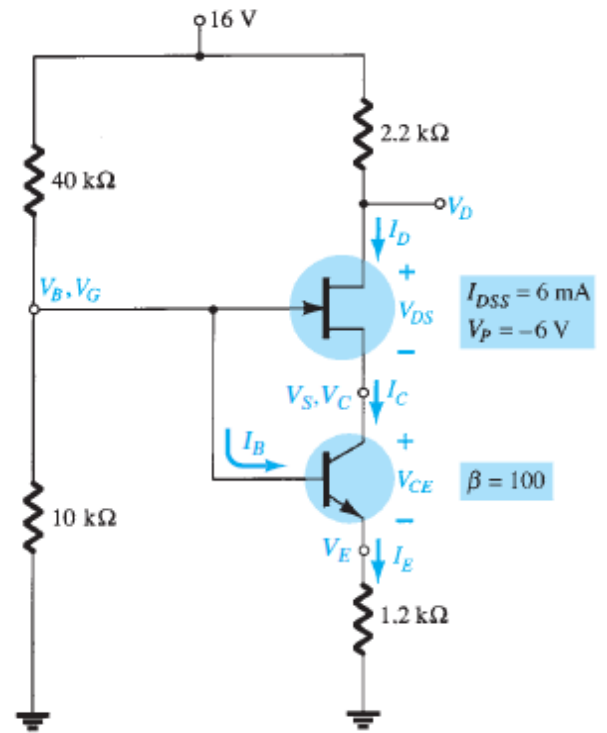
**Note/Use standard values.**

**Question six:**

**(10 Marks)**

For the combination network of Figure below, determine **(1 Mark each)**

#	Parameter	Value	Unit
1.	$V_B$		
2.	$V_G$		
3.	$V_E$		
4.	$I_E$		
	$I_C$		
5.	$I_D$		
6.	$I_B$		
7.	$V_C$		
8.	$V_S$		
	$V_D$		
9.	$V_{CE}$		
10.	$V_{DS}$		



*End of Questions*  
*Good Luck*