0H.T.No. | | | | | | | | | | |

Code No: EC1514 **GEC-R14**

II B. Tech I Semester Regular Examinations, November 2016

ELECTRONIC DEVICES AND CIRCUITS

(Electronics and Communication Engineering)

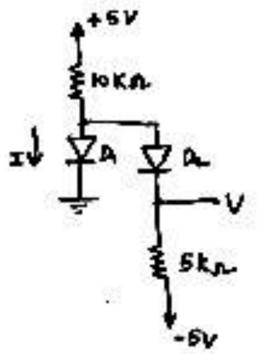
Time: 3 Hours **Max. Marks: 60**

Note: All Questions from **PART-A** are to be answered at one place.
Answer any **FOUR** questions from **PART-B.** All Questions carry equal Marks.

PART-A

6 × 2 = 12M

1. The reverse saturation current of a silicon PN junction diode is 10μA.Calculate the diode current for the forward bias voltage of 0.65V at 27^0C and also find the current if temperature raised to 37^0C.
2. Find the values of I and V in the figure. (Diodes used are ideal).



3. A FET has driven current of 4mA, I_{DSS}=8mA and V_P =6V. Find the value of $V_{GS.}$
4. What is body effect?
5. Draw the output characteristics of BJT in common emitter configuration.
6. Draw the frequency response of an amplifier.

PART-B

4 × 12 = 48M

1. a) Derive the diode current equation under forward bias condition. (7M)
   b) Explain the properties of an equilibrium p-n junction. (5M)
2. Explain in detail about modelling the diode forward characteristics. (12M)
3. a) With the help of circuit diagram and waveforms, explain the operation of a half- wave rectifier with capacitive filter. (8M)
   b) Consider a peak rectifier fed by a 50Hz sinusoid having a peak value V_p=100V. Let a load resistance R=10 KΩ. Find the value of capacitance that will result in a peak –peak ripple of 2V. (4M)
4. a) Explain the operation of an n-channel enhancement mode MOSFET and draw its $i_D – v_{DS}$ characteristics. (8M)

b) Consider an n-channel MOSFET with t_{ox} = 20μm, μ_n=650 cm^2/V-s, V_t=0.7V and W/L=10. Find the drain current for the following: i) V_{GS}=5V and V_{DS}=1V, ii) V_{GS}= V_{DS} =5V. (4M)

5. a) Explain how BJT acts as an amplifier in detail. (6M)

b) Assume that a silicon transistor with β=50, V_{BE}=0.6V, V_{CC}=22.5V and R_C=5.6KΩ is used self bias circuit. It is desired to establish a Q-point at V_{CE}=12V, I_C=1.5mA, and a stability factor S ≤ 3.Calculate the values R_e, R_1 and R_2. (6M)

6. a) A MOSFET connected in the CS configuration has a transconductance g_m=5mA/V. When a resistance R_s is connected in the source lead, the effective transconductance is reduced to 1mA/V. Estimate the value of R_s. (4M)

b) Using circuit diagram and small-signal model, derive expressions for A_i, R_i, A_v and R_o of a BJT common-emitter amplifier at low frequencies. (8M)

*****