# B.TECH. SEM -IV ELECTRONICS / BIO MEDICAL 2014
## COURSE (CBCS) : SUMMER - 2018
## SUBJECT: ELECTRONIC CIRCUITS AND APPLICATIONS

**Day:** Tuesday **Time:** 10.00 AM TO 01.00 PM
**Date:** 05/06/2018 **S-2018-2292** **Max. Marks: 60**

---

**N.B:**

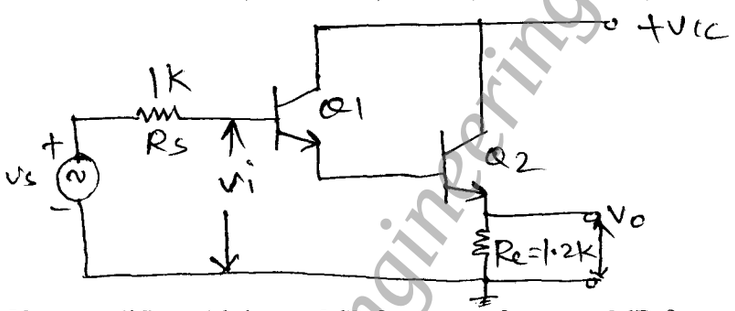
1) All questions are **COMUPLSORY.**
2) Figures to the right indicate **FULL** marks.
3) Use of non-programmable **CALCULATOR** is allowed.
4) Draw neat and labeled diagram **WHEREVER** necessary.

---

**Q.1** Discuss the various schemes to couple the output of first stage to the input of second stage in two amplifiers with the help of circuit diagrams. **(10)**

**OR**

**Q.1** For Darlington pair emitter follower shown in the following figure $Q_1$ has $h_{ie1} = 8K\Omega$, $h_{fe1} = 80$, $h_{re1} = h_{oe1} = 0$ and $Q_2$ has $h_{ie2} = 1.5\ K\Omega$, $h_{fe2} = 100$, $h_{re2} = h_{oe2} = 0$, determine i) $R_i$ ii) $A_v$ iii) $A_i$ iv) $R_o$ **(10)**




**Q.2 a)** If an amplifier with lower 3dB frequency $f_L$, upper 3dB frequency $f_H$ and mid-frequency gain $A_{mid}$ is used in feedback application with feedback factor $\beta$, show that: lower 3dB frequency of the feedback amplifier $(f_{Lf}) = \frac{f_L}{1+\beta A_{mid}}$ and upper 3 dB frequency of the feedback amplifier $(f_{Hf}) = f_H (1 + \beta A_{mid})$. **(06)**

**b)** Describe transconductance and transresistance amplifier. **(04)**

**OR**

**Q.2** Determine the voltage gain, input and output impedance with feedback for voltage series feedback having A = -100, $R_i = 10K\Omega$, $R_o = 20K\Omega$ for feedback of i) $\beta = -0.1$ and ii) $\beta = -0.5$ **(10)**

**Q.3** Derive the expressions for efficiency of class A power amplifier with: **(10)**
i) Resistive load (series fed)
ii) Transformer coupled load

**OR**

**Q.3 a)** Describe the working of complementary symmetry class B amplifier. **(06)**

**b)** Explain origin of crossover distortion. Describe a method to minimize this distortion. **(04)**

**P.T.O.**

**Q.4** Draw equivalent circuit of a quartz crystal. Describe significance of each component of the equivalent circuit. Draw circuit diagram of Pierce crystal oscillator and explain its working. **(10)**

**OR**

**Q.4 a)** Calculate the component values of the Wien bridge suitable to be used in the oscillator to vary the frequency from 200Hz to 20KHz in the two ranges. **(06)**

**b)** In Colpitts oscillator, the frequency of oscillations is observed to be 2.5 MHz oscillator uses: L = 20 $\mu H, C_1 = 0.04\,\mu F$ **(04)**

Find: i) Value of $C_2$ ii) If L is doubled, the new value of frequency of oscillations.

**Q.5 a)** Describe the internal structure of IC 723 with the help of simplified functional block diagram. **(06)**

**b)** List the important features of the regulator IC 723. **(04)**

**OR**

**Q.5** An emitter follower voltage regulator is to supply a load current 0-2A at 10V. The unregulated DC supply varies from 14V to 18V. Use a zener diode with $V_Z$=8.5V and which requires a minimum of 1mA current for stable operation. The series transistor has $h_{fe}$=50 and $V_{BE}$=0.5V. Determine, **(10)**

i) Value of resistor R to be connected between collector and base of transistor and its wattage rating.

ii) Maximum power dissipation rating for zener diode and transistor.

**Q.6 a)** Derive the equation for $g_m$, which gives relation between $g_m$, $I_C$ and temperature. **(05)**

**b)** Define $f_\beta$ and $f_T$. What is the relationship between $f_\beta$ and $f_T$. **(05)**

**OR**

**Q.6** For a BJT amplifier the following values are known: **(10)**
Operating temperature T = $300^0$K, $I_{CQ}$ = 2.5 mA
$rbb' = 100\Omega, rb'e = 1K\Omega, rb'c = 2M\Omega, r_{ce} = 80K\Omega, C_{b'e} = 200pF$
$C_{b'c} = 3pf$, $f_T = 70MHz$. Obtain the h- parameters if K =1.381x$10^{-23}$ J/°k and q = 1.6 x $10^{-19}$ C.

* * * *