S.V. NATIONAL INSTITUTE OF TECHNOLOGY, SURAT-395007

Electrical Engineering Department

B.Tech. II year (3rd semester) Mid-semester exam (Sept-2014)

Subject: **Linear Electronics (EC-209)**

Total marks: 30 Date: 24/09/2014

Instructions: Time: 1 hour

1) Attempt all questions.
2) Assume suitable data if necessary.
3) Figure to right indicate marks.

Q.1 (a) What is base-width modulation in bipolar junction transistor? What are the effects of base-width modulation on the recombination current, transit time, Current gain-α and current gain-β. **5**

Q.1 (b) Explain the MOSFET Inverter characteristic and derive the equation for threshold voltage. **5**

Q-2 (a) Draw Trans-conductance feedback amplifier and derive equation of gain, input impedance and output impedance. **7**

Q-2 (b) Draw and explain common source FET configuration and derive the equation of gain. **3**

OR

Q-2 (b) Draw the input-output characteristic of common Emitter configuration. And also explain the effect of Collector to Emitter voltage (V_{CE}) on the input-output characteristic when V_{CE} is change. **3**

Q.3 (a) Draw the collector to base (C-B) bias circuit. Find the stability factor for the same. Also Justify: "The collector to base (C-B) bias circuit is stable circuit." **5**

Q.3 (b) Obtain the values of R_1 and R_2 to provide the following Bias condition to a Si transistor arranged as in the circuit shown in figure (A). **5**

S=10, V_{CC}=12V, I_C=20mA, R_E=0.1kΩ, R_C=0.33kΩ, C_1=10μF, C_2=10μF, β=100
Neglect the Base current I_B.

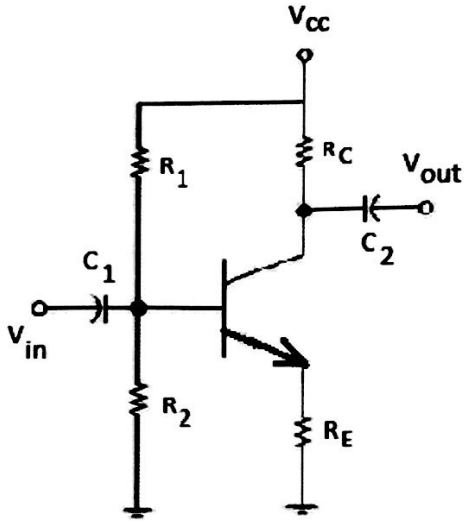

Figure (A)

OR

Q.3 (a) Briefly explain the current flow mechanism in BJT. Also derive the equation of β in terms of α. **5**

Q.3 (b) Find β, I_B, I_C, and V_{CE} for the circuit shown in figure (B) and also identify in which region the transistor is operating. Assume Ge transistor. **5**
V_{CC}=12V, R_C=50Ω, R=1000kΩ $\alpha = 0.99$

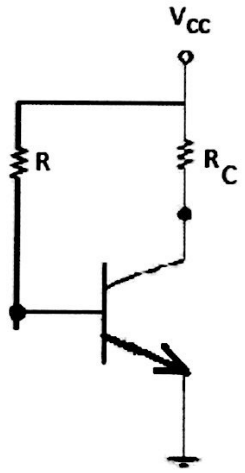

Figure (B)