

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-IV • EXAMINATION – SUMMER 2013****Subject Code: 141101****Date: 12-06-2013****Subject Name: Advance Electronics****Time: 10:30am – 01:00pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Define and obtain expression for a transconductance (g_m) for p-n-p transistor in the CE configuration as function of I_C . Obtain its value for I_C equal to 10 mA. **07**
- (b) Draw hybrid- π circuit for a single-stage CE transistor amplifier having load resistance R_L and obtain expression for short-circuit current gain and bandwidth. **07**
- Q.2** (a) Design RC coupled amplifier with low 3-dB frequency not more than 10 Hz for following two cases: a. FET devices with input resistance of 1M are used, and b. BJT devices with input resistance of 1 K and $1/h_{oe} = 40$ K are used. Assume that load resistance equal to 1 K. **07**
- (b) Discuss the effect of emitter bypass capacitor on low-frequency response of single stage CE amplifier. Draw magnitude plot of gain for low frequency clearly indicating zero and pole introduced due to bypass capacitor. **07**
- OR**
- (b) An amplifier has a midband gain of 100, a lower 3-dB frequency of 0.1 Hz and an upper 3-dB frequency of 100 Hz. Determine the frequency range for which the gain is at least 99. **07**
- Q.3** (a) Classify and discuss types of amplifier on the basis of magnitudes of input and output resistances of amplifier relative to the source and load impedances, respectively. Draw necessary equivalent diagrams. **07**
- (b) Draw FET-based source follower, identify type of feedback and carry out analysis to obtain A_{Vf} , R_{if} and R_{of} . **07**
- OR**
- Q.3** (a) Explain the concept of feedback and categorize feedback amplifiers depending upon connection of mixer and sampling networks. Provide necessary drawings. Discuss advantages of negative feedback. **07**
- (b) Obtain G_{Mf} , A_{Vf} and R_{if} expressions for single stage BJT-based current series feedback amplifier. Draw necessary circuit schematics. **07**
- Q.4** (a) Draw FET-based RC phase shift oscillator along with its small-signal equivalent circuit. Obtain expression for frequency of oscillation. **07**
- (b) List out characteristics of ideal operational amplifier. Draw non-inverting op-amp circuit, and obtain closed loop gain for the same. Assume op-amp open gain = A_v , input resistance = R_i , and output resistance = R_o . **07**
- OR**
- Q.4** (a) Draw op-amp based Wien bridge oscillator. Obtain frequency of oscillation and discuss amplitude stabilization for the same. **07**
- (b) Explain measurement setup and techniques to obtain following op-amp parameter values: 1. Input offset voltage, 2. Input bias current, 3. Common-

mode rejection ratio, and 4. Slew rate.

- Q.5** **(a)** Explain working of successive approximation ADC with block diagram. **07**
 (b) Defined following terms related to digital circuit: 1. Fan out, 2. Propagation **07**
 delay, 3. Noise margin. Draw modified (integrated-circuit) DTL NAND (3-
 input) gate and explain its working.

OR

- Q.5** **(a)** Draw 4-bit R-2R ladder type DAC and explain its working. Compare it with **07**
 weighted resistor type DAC.
 (b) List the parameters, generally used, to compare logic families. Draw and **07**
 explain working of three-input TTL NAND gate.
