

GUJARAT TECHNOLOGICAL UNIVERSITY
PDDC - SEMESTER-III • EXAMINATION – SUMMER 2013

Subject Code: X31101**Date: 09-05-2013****Subject Name: Advance Electronics****Time: 02.30 pm - 05.30 pm****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) Show that at low frequencies the hybrid- π model with $r_{b'e}$ and r_{ce} taken as infinite reduces to the approximate CE h-parameter model. **07**
- (b) Derive the expression for the CE short-circuit current gain A_i as a function of frequency **07**
- Q.2** (a) Prove that over the range of frequencies from $10 f_L$ to $0.1 f_H$, the voltage amplification is constant to within 0.5 percent and the phase shift to within ± 0.1 rad. **07**
- (b) Assuming non interacting stages, three identical cascaded stages have an overall upper 3-dB frequency of 20 kHz and a lower 3-dB frequency of 20 Hz. What are f_L and f_H of each stage? **07**
- OR**
- (b) It is desired to have voltage gain of an RC coupled amplifier at 60 Hz, which does not decrease by more than 10% from its midband value. Show that the coupling capacitance C must be at least equal to $5.5/(R_o + R_i)$. The resistors are expressed in kilohms and C in microfarads. **07**
- Q.3** (a) List five characteristics of an amplifier which are modified by negative feedback. **07**
- (b) An amplifier with an open-loop voltage gain of 1000 delivers 10 W of output power at 10 % second harmonic distortion when the input signal is 10 mV. If 40 dB negative feedback is applied and the output power is to remain at 10 W, determine the required input signal and the percent harmonic distortion. **07**
- OR**
- Q.3** (a) Draw the circuit of a voltage-shunt feedback amplifier. **07**
- (b) The output impedance may be calculated as the ratio of open-circuit voltage to the short-circuit current. Using this method, evaluate R_{of} for all the four feedback topologies. **07**
- Q.4** (a) With the help of a neat sketch, for an underdamped two-pole amplifier response, define rise time, delay time, overshoot, damped period, settling time. **07**
- (b) State and explain the Nyquist stability criterion. **07**
- OR**
- Q.4** (a) With the aid of graphs, define gain margin and phase margin. **07**
- (b) Sketch the circuit of a Wien bridge oscillator. What determines the frequency of oscillation? **07**
- Q.5** (a) List six characteristics of the ideal OP AMP. **07**
- (b) Draw the h-parameter model for the common-mode gain in the DIFF AMP. **07**

OR

- Q.5** **(a)** Derive voltage gain formulas for inverting and non-inverting OP-AMP closed loop configurations. **07**
- (b)** Compare the logic families DTL,TTL and DCTL. **07**
