GUJARAT TECHNOLOGICAL UNIVERSITY BE - SEMESTER-IV • EXAMINATION – SUMMER 2013

Subject Code: 141101

Subject Name: Advance Electronics

Time: 10:30am – 01:00pm

Total Marks: 70

Date: 12-06-2013

- 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 07 in the CE configuration as function of I_C. Obtain its value for I_C equal to 10 mA.
 - (b) Draw hybrid-pi circuit for a single-stage CE transistor amplifier having load 07 resistance R_L and obtain expression for short-circuit current gain and bandwidth.
- **Q.2** (a) Design RC coupled amplifier with low 3-dB frequency not more than 10 Hz **07** 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.
 - (b) Discuss the effect of emitter bypass capacitor on low-frequency response of 07 single stage CE amplifier. Draw magnitude plot of gain for low frequency clearly indicating zero and pole introduced due to bypass capacitor.

OR

- (b) An amplifier has a midband gain of 100, a lower 3-dB frequency of 0.1 Hz 07 and an upper 3-dB frequency of 100 Hz. Determine the frequency range for which the gain is at least 99.
- Q.3 (a) Classify and discuss types of amplifier on the basis of magnitudes of input 07 and output resistances of amplifier relative to the source and load impedances, respectively. Draw necessary equivalent diagrams.
 - (b) Draw FET-based source follower, identify type of feedback and carry out 07 analysis to obtain A_{Vf} , R_{if} , and R_{of} .

OR

- Q.3 (a) Explain the concept of feedback and categorize feedback amplifiers 07 depending upon connection of mixer and sampling networks. Provide necessary drawings. Discuss advantages of negative feedback.
 - (b) Obtain G_{Mf}, A_{Vf}, and R_{if} expressions for single stage BJT-based current series 07 feedback amplifier. Draw necessary circuit schematics.
- Q.4 (a) Draw FET-based RC phase shift oscillator along with its small-signal 07 equivalent circuit. Obtain expression for frequency of oscillation.
 - (b) List out characteristics of ideal operational amplifier. Draw non-inverting opamp 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 .

OR

- Q.4 (a) Draw op-amp based Wien bridge oscillator. Obtain frequency of oscillation 07 and discuss amplitude stabilization for the same.
 - (b) Explain measurement setup and techniques to obtain following op-amp 07 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.
 - (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.

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