

B.Tech II Year - II Semester Examinations, April/May-2012**LINEAR & DIGITAL IC APPLICATIONS****(ELECTRICAL AND ELECTRONICS ENGINEERING)****Time: 3 hours****Max. Marks: 80****Answer any five questions****All questions carry equal marks**

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- 1.a) Explain at least five major electrical characteristics (both AC & DC) of an op-amp.
- b) An amplifier using an op-amp with slew-rate, $SR = 0.5V/\mu\text{sec}$ has a gain of 40dB. Estimate the maximum frequency of a sinusoidal input signal of peak value, 2V rms that can be handled without excessive distortion. [10+6]
- 2.a) Explain the three basic modes of operation and possible applications using an open-loop ideal op-amp.
- b) Explain why compensation is required for the frequency response of an un-compensated op-amp. Discuss the pole-zero frequency compensation technique with neat sketches and necessary equations. [8+8]
- 3.a) With neat sketches, explain the operation of Astable multivibrator using 555 timer and derive expression for its frequency of oscillations.
- b) Draw the functional block diagram of IC565 PLL. Derive expressions for lock-in range and capture range. [8+8]
- 4.a) Draw the functional block diagram of IC 1496 balanced modulator and explain its operation in detail.
- b) Draw the circuit diagram and explain the operation of series voltage regulator using op-amp. Derive an expression for its output voltage. [8+8]
- 5.a) Design a Butterworth active low pass filter for given normalized polynomial of $S^2 + 1.414 S + 1$?
- b) Draw the circuit of all pass filter and explain its operation. Also derive expression for its transfer function. [8+8]
- 6.a) Design 2-input NAND & NOR gates using CMOS transistors. With the help of truth tables explain their operation.
- b) Draw the circuit of 2- input NAND gate using Diode Transistor Logic. With the help of truth table explain its operation. [8+8]
- 7.a) Draw the sample & hold circuit using op-amp. Explain its operation in detail. Also discuss the need of sample & hold circuit in electronic circuit design.
- b) Draw and explain the operation of dual-slope ADC. Explain why it is preferred in a digital voltmeter. [8+8]
- 8.a) Draw and explain the operation of R-2R ladder DAC. Also derive expression for its output voltage.
- b) Compare the conversion times for counter type, successive approximation type, flash type n-bit A to D converters. [10+6]

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