

Code.No: R05311102

R05

SET-1

**III B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010**  
**LINEAR & DIGITAL IC APPLICATIONS**  
**(COMMON TO BME, E.CON.E, ECC, ETM)**

**Time: 3hours****Max.Marks:80**

**Answer any FIVE questions**  
**All questions carry equal marks**

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- 1.a) List out the ideal characteristics of an Op-amp.
- b) With neat block diagram explain the function of various building blocks of an Op-amp?
- c) Draw the equivalent circuit of an Op-amp. [3+10+3]
  
- 2.a) With the help of a neat circuit diagram, explain the operation of a three op-amp instrumentation amplifier and obtain the expression for its output voltage?
- b) Find  $R_1$  and  $R_f$  in the practical integrator (lossy integrator), so that the peak gain is 20 dB and the gain is 3 dB down from its peak when  $\omega = 10,000$  rad/sec. Use a capacitance of  $0.01\mu\text{F}$ . [8+8]
  
- 3.a) Draw the circuit of a triangular-wave generator, explain its operation and derive expressions for frequency of oscillations?
- b) Explain the term "VSVS configuration". Design a VCVS low-pass Butterworth second order filter with a cutoff frequency of 5 KHz. Assume necessary data. [8+8]
  
- 4.a) Explain the operation of Monostable multivibrator using 555 timer and derive expression for its output pulse-width?
- b) Draw the circuit of Schmitt trigger using 555 timer and explain its operation? [10+6]
  
- 5.a) With a net sketch explain the operation of an n-bit Weighted Resistor DAC and obtain expression for its output?
- b) Which is the fastest ADC, explain the operation and discuss its merits & de-merits? [8+8]
  
- 6.a) Design CMOS transistor circuit for 2-input NOR gate? Explain its operation with the help of Truth-Table?
- b) Draw the schematic circuit of TTL active pull-up NAND gate and explain its operation with the help of Truth-Table? [8+8]
  
- 7.a) Design a 3 input 5-bit multiplexer? Write the truth table and draw the logic diagram?
- b) Design a full subtractor with logic gates? [8+8]
  
- 8.a) Explain the operation of Synchronous SRAM with the help of its internal Architecture?
- b) Design a conversion circuit to convert a D flip-flop to J-K flip-flop? [8+8]

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- 1.a) Draw the circuit of a triangular-wave generator, explain its operation and derive expressions for frequency of oscillations?
- b) Explain the term “VSVS configuration”. Design a VCVS low-pass Butterworth second order filter with a cutoff frequency of 5 KHz. Assume necessary data. [8+8]
- 2.a) Explain the operation of Monostable multivibrator using 555 timer and derive expression for its output pulse-width ?
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- 7.a) List out the ideal characteristics of an Op-amp.
- b) With neat block diagram explain the function of various building blocks of an Op-amp?
- c) Draw the equivalent circuit of an Op-amp. [3+10+3]
- 8.a) With the help of a neat circuit diagram, explain the operation of a three op-amp instrumentation amplifier and obtain the expression for its output voltage?
- b) Find  $R_1$  and  $R_f$  in the practical integrator (lossy integrator), so that the peak gain is 20 dB and the gain is 3 dB down from its peak when  $\omega = 10,000$  rad/sec. Use a capacitance of  $0.01\mu\text{F}$ . [8+8]

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- 1.a) With a neat sketch explain the operation of an n-bit Weighted Resistor DAC and obtain expression for its output?
- b) Which is the fastest ADC, explain the operation and discuss its merits & de-merits? [8+8]
- 2.a) Design CMOS transistor circuit for 2-input NOR gate? Explain its operation with the help of Truth-Table?
- b) Draw the schematic circuit of TTL active pull-up NAND gate and explain its operation with the help of Truth-Table? [8+8]
- 3.a) Design a 3 input 5-bit multiplexer? Write the truth table and draw the logic diagram?
- b) Design a full subtractor with logic gates? [8+8]
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- b) Find  $R_i$  and  $R_f$  in the practical integrator (lossy integrator), so that the peak gain is 20 dB and the gain is 3 dB down from its peak when  $\omega = 10,000$  rad/sec. Use a capacitance of  $0.01\mu\text{F}$ . [8+8]
- 7.a) Draw the circuit of a triangular-wave generator, explain its operation and derive expressions for frequency of oscillations?
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- 8.a) Explain the operation of Monostable multivibrator using 555 timer and derive expression for its output pulse-width ?
- b) Draw the circuit of Schmitt trigger using 555 timer and explain its operation? [10+6]

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- 1.a) Design a 3 input 5-bit multiplexer? Write the truth table and draw the logic diagram?
- b) Design a full subtractor with logic gates? [8+8]
- 2.a) Explain the operation of Synchronous SRAM with the help of its internal Architecture?
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- b) Draw the schematic circuit of TTL active pull-up NAND gate and explain its operation with the help of Truth-Table? [8+8]

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