

III B. Tech I Semester Regular/Supplementary Examinations, October/November - 2017
LINEAR IC APPLICATIONS

(Common to Electronics and Communication Engineering, Electronics and Instrumentation
Engineering and Electronics and Computer Engineering)

Time: 3 hours

Max. Marks: 70

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- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
 2. Answering the question in **Part-A** is compulsory
 3. Answer any **THREE** Questions from **Part-B**
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PART -A

- | | | |
|---|--|------|
| 1 | a) Draw the equivalent circuit for practical op amp. | [3M] |
| | b) List out AC and DC characteristics of operational amplifiers. | [4M] |
| | c) What are the applications of V-I and I-V converters? | [3M] |
| | d) Design a first order LPF for Cut-off frequency 1KHz and pass band gain 2. | [4M] |
| | e) Draw a pin configuration for 555 IC Timer. | [4M] |
| | f) Define accuracy and resolution of the DACs. | [4M] |

PART -B

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|---|---|-------|
| 2 | a) What is the significance of level shifter? | [4M] |
| | b) Derive an expression for voltage gain for dual input balanced output differential amplifier. | [8M] |
| | c) Distinguish between AC and DC analysis in amplifiers. | [4M] |
| 3 | a) Draw the generalized block diagram for the operational amplifier. Explain each block in detail | [8M] |
| | b) Define i) CMRR ii) PSRR iii) DRIFT iv) Output offset voltage. | [8M] |
| 4 | a) With neat sketch explain the operation of OP amp Integrator circuit. | [8M] |
| | b) Explain the operation of the instrumentation amplifier. | [8M] |
| 5 | a) Explain the operation of All pass filter with a neat diagram. | [10M] |
| | b) With neat sketch explain the operation of IC 1496 balanced modulator. | [6M] |
| 6 | a) Draw and explain the basic block diagram of the PLL . | [6M] |
| | b) What is VCO ,draw and explain the functional block diagram of VCO | [10M] |
| 7 | a) In detail how the digital information converted into analog information by using 4bit binary weighted resistor method. | [8M] |
| | b) Give short notes on successive approximation ADC. | [8M] |



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PART -A

- | | | |
|------|--|------|
| 1 a) | What is the purpose of Level translator in op amp? | [3M] |
| b) | Draw the pin configuration of the IC 741C | [4M] |
| c) | What are the applications of integrator and differentiator | [4M] |
| d) | Define capture range and Lock range in PLL. | [4M] |
| e) | What is the significance of All pass filter? | [3M] |
| f) | An 8bit DAC has final out put reading of the 5.55V with input of 1111, find the resolution and output voltage. | [4M] |

PART -B

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|-------|---|------|
| 2. a) | Derive the Differential Amplifier- AC analysis of single input dual output Configuration in detail. | [8M] |
| b) | Explain the IC 741 op-amp block diagram & its features in detail. | [7M] |
| 3 a) | List out the applications and temperature ranges of IC 7410 op amp. | [3M] |
| b) | Explain the Frequency Compensation techniques of op-amp in detail. | [7M] |
| c) | Define the following i)Input offset voltage ii) Slew rate iii)Bias circuit | [5M] |
| 4 a) | Derive the output expression for the practical integrator circuit. | [7M] |
| b) | Derive frequency of oscillations by using triangular wave generator. | [8M] |
| 5 a) | Draw the circuit diagram of All pass filters and derive its output response. | [8M] |
| b) | Draw the 2nd order band pass filter and explain its operation in detail. | [8M] |
| 6 a) | Draw the block diagram of Astable operations using IC 555 and derive its time Constant. | [8M] |
| b) | Draw the circuit diagram of VCO 566 and explain its operation. | [8M] |
| 7 a) | Draw the circuit diagram of counter type ADC and explain its operation in detail. | [8M] |
| b) | Explain the operation of R-2R ladder 4 bit DAC with step output waveforms. | [8M] |

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PART -A

- | | | | |
|---|----|---|------|
| 1 | a) | What are the ideal characteristics of the op-amp? | [3M] |
| | b) | Derive an expression for CMRR. | [4M] |
| | c) | What are the advantages of IC over discrete circuits? | [3M] |
| | d) | What are the applications of Analog switches? | [4M] |
| | e) | Define PLL and list out the applications of the PLL. | [4M] |
| | f) | What are the different techniques for DAC? | [4M] |

PART -B

- | | | | |
|---|----|--|-------|
| 2 | a) | What is the significance of coupling? Explain about DC coupling. | [5M] |
| | b) | Give DC and AC analysis for dual input balanced output differential amplifier. | [10M] |
| 3 | a) | What is op amp? Draw the ideal and practical characteristics of op amp | [3M] |
| | b) | What are the important parameters of op amp, explain them in practical view. | [8M] |
| | c) | Describe the input offset compensating network for inverting op amp. | [5M] |
| 4 | a) | What is the output voltage of integrator when step input voltage of 5V with 5ms is applied | [8M] |
| | b) | Explain the operation of precision rectifiers with neat sketch. | [8M] |
| | c) | Explain the principal of operation of comparator. | |
| 5 | a) | Explain the operation of narrow band reject filter with characteristics. | [8M] |
| | b) | Draw the block diagram of four quadrant multiplier and explain its operation in detail. | [8M] |
| 6 | a) | Draw and Explain the principles and description of individual blocks of PLL in detail. | [8M] |
| | b) | Explain the terms frequency multiplication, frequency translation of PLL | [8M] |
| 7 | a) | Describe the operation of the dual slope ADC. | [8M] |
| | b) | Compare the characteristics and specifications of ADC and DACs. | [8M] |



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PART -A

- 1 a) Draw the configuration of single input unbalance output differential amplifier. [3M]
 b) Define slew rate? Give typical value for 741C Op-amp. [4M]
 c) Explain why an open-loop Op-amp is unsuitable for linear applications? [3M]
 d) Draw the circuit of sample and hold amplifier. [4M]
 e) Draw the block diagram of PLL and list out each block name. [4M]
 f) Define conversation time and settling time in ADC and DAC. [4M]

PART -B

- 2 a) What is the main advantage of constant current bias over emitter bias in differential amplifiers? [4M]
 b) Derive an expression for voltage gain for dual input unbalanced output differential amplifier. [8M]
 c) Draw the configuration for difference amplifier. [4M]
- 3 a) Differentiate between ideal and practical op amp specifications. [3M]
 b) An op-amp has a slew rate of $2V/\mu s$. What is the maximum frequency of an output sinusoid of peak value 5V at which the distortion sets in due to the slew rate limitation [8M]
 c) List out the different types of integrated circuits and their package types. [4M]
- 4 a) Explain the operation of a grounded load V to I converter using op-amp. [8M]
 b) Explain the monostable multivibrator operation by using op amp. [8M]
 c) Design a practical op-amp differentiator circuit for the frequency of 1KHz and explain its frequency response.
- 5 a) Design the 2nd order HPF and explain its operation in detail. [8M]
 b) Draw the 2nd order band pass filter and explain its operation in detail. [8M]
- 6 a) Explain the monostable operation of 555 IC timer with neat sketch. [8M]
 b) With a clear block diagram explain frequency multiplier using PLL. [8M]
- 7 a) Draw the circuit diagram of dual slope ADC and explain its operation. [8M]
 b) What are the draw backs of weighted resistor DAC? How they can be overcome by using R-ZR ladder DAC. [8M]

