

EC 2254 Linear Integrated Circuits

Time: Three Hours

Maximum: 100 marks

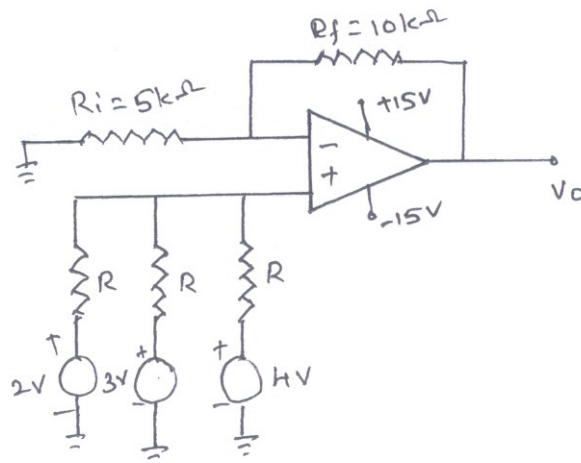
Answer ALL Questions

Part A - (10 x 2 = 20 marks)

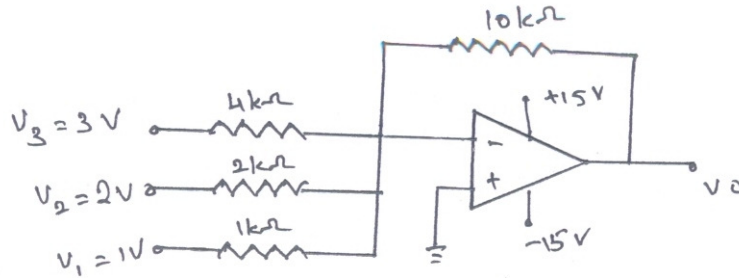
1. Define current mirror with magnification,
2. Define slew rate.
3. Why *are* integrators preferred over differentiators?
4. What is comparator?
5. What *are* the advantages of variable transconductance technique?
6. Define: Capture range of a PLL.
7. What is meant by resolution of a DAC?
8. Which is *the* fastest ADC? State *the* reason.
9. Define *the* duty cycle in astable multivibrator using IC 555.
10. What are the advantages of Switched capacitor filter over active filters?

Part B - (5 x 16 = 80 marks)

11. (a) (i) With a neat circuit diagram and with necessary equations, explain *the* concept of Widlar current source used in op-amp circuit. (10)
(ii) For the non-inverting op-amp shown in figure below, find the output voltage V_o . (6)



11. (b) (i) With a neat block diagram, explain *the* general stages of an OP-AMP. (6)
- (ii) Explain, with a circuit diagram, *the* working of BJT - emitter coupled differential amplifier. Also explain the concept of active load and sketch *the* relevant circuit diagram. (10)
12. (a) (i) Explain *the* construction and working of OP-AMP based instrumentation amplifier. (8)
- (ii) Draw an adder-subtractor type of circuit with op-amp to obtain the relation $V_a = (I_1 + I_2) - (I_3 + I_4)$ (4)
- (iii) Calculate the output of *the* following circuit. (4)



Or

12. (b) (i) Explain *the* working of OP-AMP based Schmitt trigger circuit. (8)
- (ii) Design an OP-AMP based second order active low pass filter with cut off frequency 2 kHz. (8)
13. (a) (i) Sketch and explain *the* multiplier cell using emitter-coupled transistor pair. Prove that the output voltage is proportional to *the* product of *the* two input voltages. (12)
- (ii) State *the* limitations of emitter-coupled pair. (4)

OR

13. (b) (i) With usual notations, show that the 'lock-in-range' of PLL is $\pm 0.8f_0/V$. (10)
- (ii) Explain how *the* IC 565 PLL can be used as a FSK demodulator. (6)
14. (a) Explain *the* following types of digital to analog converters, with suitable circuit diagrams:
- (i) Binary weighted resistor DAC (6)
- (ii) R-2R Ladder DAC (5)
- (iii) Inverted R-2R Ladder DAC (5)

OR

14. (b) (i) Draw *the* circuit of a flash type ADC and explain. (8)
- (ii) What is the purpose of 'high speed sample and hold circuit'? Sketch such a circuit and explain. Also name *the* parameters associated with it. (8)

15. (a) (i) With neat functional block diagram, explain the working of IC 555 in astable mode. (8)
- (ii) Describe in detail, the working principle of IC 8038 function generator. (8)

OR

15. (b) (i) With a neat functional diagram, explain the operation of LM 380 power amplifier. (8)
- (ii) Explain the operation of switched capacitor filter. What are the advantages and disadvantages of this type of filter? (8)