

Reg. No. :

**Question Paper Code : 20516**

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2022.

Fourth Semester

Electrical and Electronics Engineering

EE 8451 — LINEAR INTEGRATED CIRCUITS AND APPLICATIONS

(Common to : Electronics and Instrumentation Engineering/Instrumentation and Control Engineering)

(Regulations 2017)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. List out the steps involved in Silicon Wafer preparation.
2. Draw the monolithic IC structure of NPN transistor.
3. Define input bias current.
4. Draw the equivalent circuit diagram of OPAMP.
5. Draw the transfer characteristic of a comparator.
6. What is the function of a sample and hold circuit?
7. List out the applications of Analog Multiplier ICs.
8. What is the need for 555 timer?
9. Write the significances of Instrumentation Amplifier.
10. Compare 78 xx and 79 xx voltage regulator ICs.

PART B — (5 × 13 = 65 marks)

11. (a) Explain the following IC fabrication process with necessary diagram
- (i) Epitaxial growth (6)
  - (ii) Photolithography (7)
- Or
- (b) Discuss the different types of integrated resistor fabrication. (13)
12. (a) Explain DC characteristics of OPAMP. (13)
- Or
- (b) Explain with a circuit diagram the differentiator and integrator designed using OPAMP. Find  $V_o$  when  $V_{in}$  is square wave and sinewave with amplitude of  $V_m$ . (13)
13. (a) (i) Explain with a neat circuit diagram the Instrumentation Amplifier and derive the expression for output voltage. (10)
- (ii) Explain the operation of Half Wave Precision Rectifier. (3)
- Or
- (b) (i) Explain with block diagram the Successive Approximation type ADC. (7)
- (ii) Explain with Circuit diagram the 4 – bit binary weighted resistor type DAC. (6)
14. (a) Discuss in detail with help of block diagram the Frequency Multiplication/division using PLL. (13)
- Or
- (b) Explain the functional block of 555 timer IC and design Astable multivibrator of 1kHz using it. Assume duty cycle is 60%. (13)
15. (a) (i) Explain with a neat diagram the principle of operation and working of SMPS. (7)
- (ii) Design a voltage regulator for adjustable 4V-20V DC power supply with the LM317. (6)
- Or
- (b) (i) Explain Audio Power Amplifier IC 8038. (6)
- (ii) Explain with block diagram the function generator IC. (7)

PART C — (1 × 15 = 15 marks)

16. (a) (i) Design a second order active filter which can pass only the audio signal. Assume the gain of the filter is unity. (10)
- (ii) Design the decorative blinking light system using two LEDs (either LED1 or LED2 is in ON condition), where LED1 ON time is 5 seconds and LED 2 ON time is 4 seconds using 555 timer. (5)

Or

- (b) (i) In the circuit shown Fig. 16 (b) (i) the Zener diode has ideal characteristics and a breakdown voltage of 3.2 V. Find the output voltage  $V_o$  for an input voltage  $V_i = +1$  V. (7)

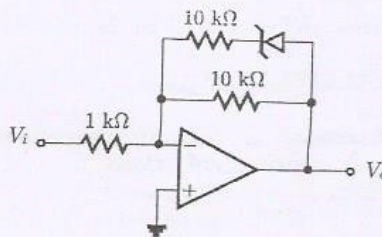


Fig. 16 (b) (i)

- (ii) The circuit shown in Fig. 16 (b) (ii) is that of a waveform generator. Assume OPAMP is ideal device, determine the output  $V_o$ . (8)

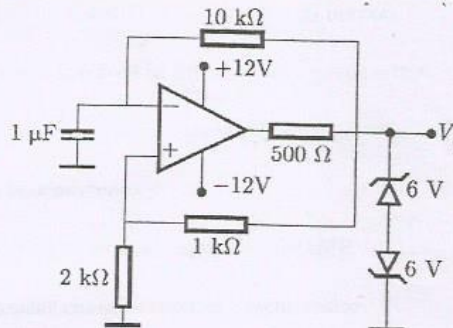


Fig. 16 (b) (ii)