Reg. No. : | | | | | | | | | | |

Question Paper Code: 44304

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2018

Fourth Semester

Electrical and Electronics Engineering

14UEE404 - ANALOG INTEGRATED CIRCUITS

(Common to Instrumentation and Control Engineering)

(Regulation 2014)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. In Monolithic IC

   (a) Performance depends on the substrate
   (b) Performance does not depend on the substrate
   (c) Performance depends on interconnects
   (d) Performance depends on packaging

2. How many leads does the TO-5 metal can package of an operational amplifier have
   (a) 8, 10, or 12 (b) 6, 8, or 10 (c) 8 or 14 (d) 8 or 16

3. If the currents flowing towards the inverting and non-inverting terminals of an Op-amp are 3 µA and 1 µA respectively, the bias current and the input offset current are

   (a) 3 µA and 1 µA (b) 2 µA and 2 µA
   (c) 3 µA and 2 µA (d) 1 µA and 2 µA

4. What is the scale multiplier (factor) of a basic integrator?
   (a) R/C (b) C/R (c) –RC (d) –1/RC

5. An instrumentation amplifier uses

(a) 1 op-amp (b) 2 op-amps (c) 4 op-amps (d) 3 op-amps

6. In applications where measurement of a physical quantity is involved, the Op-amp circuit recommended is

(a) Basic non-inverting amplifier (b) A comparator
(c) An active filter (d) An instrumentation amplifier

7. A 555 timer in monostable application mode can be used for

(a) Pulse position modulation (b) Frequency shift keying
(c) Speed control and measurement (d) Digital phase detector

8. How many V_{cc} connections does the 565 PLL use?

(a) 0 (b) 1 (c) 2 (d) 3

9. Voltage regulator LM7805 has an output voltage of

(a) 5 volts (b) -5 volts (c) 0.5 volts (d) -0.5 volts

10. What is the range of the voltage level of the LM 723 adjusted voltage regulator?

(a) 0 *V* to 5 *V* (b) 1.2 *V* to 37 *V* (c) -5 *V* to -24 *V* (d) 5 *V* to 24 *V*

PART - B (5 x 2 = 10 Marks)

11. Why aluminum is preferred for metallization?

12. Generally, IC 741 is not used for high frequency applications. Justify.

13. List the applications of Log amplifier.

14. Give the applications of multiplier IC.

15. Give the drawbacks of linear regulators.

PART - C (5 x 16 = 80 Marks)

16. (a) Mention the dimensions of a typical Integrated Circuits and different types of packaging of IC's. List the steps involved in the manufacturing process of an Integrated Circuits. Discuss the following processes in the monolithic IC technology with necessary diagram wherever necessary.

(i) Epitaxial Growth, (ii) Isolation by diffusion. (16)

Or

b) Briefly explain the various processes involved in the fabrication of monolithic bipolar transistor. (16)

17. (a) With the necessary diagrams, describe the working principles of different external frequency compensation methods. (16)

Or

(b) Explain the operation of the following applications of op-amp, also derive an expression for the output (a) differentiator (b) Integrator. (16)

18. (a) (i) What is an Instrumentation Amplifier? Draw a system whose gain is controlled by an adjustable resistance. Name the circuit that is used to detect the peak value of the non-sinusoidal waveforms. (8)

(ii) Draw the circuit of a voltage to current converter if the load is floating and grounded. Is there any limitation on the size of the load when grounded? Discuss. (8)

Or

(b) (i) Sketch the circuit diagram of clamper and explain its operation. (8)

(ii) Explain the operation of successive approximation A/D converter. (8)

19. (a) Describe the working principle voltage controlled oscillator and derive the equation (16)

Or

(b) Perform the closed-loop analysis of Phase Locked Loop (PLL) and derive the transfer function of PLL. Also derive the expressions for the lock-in and capture range of IC 565 Phase Locked Loop (PLL) with neat diagram. Calculate the output frequency, lock-range and capture-range of IC 565. Assume R1=10 Ω, C_1 = 0.01 µF and C = 20 µF. (16)

20. (a) With neat circuit diagram explain the working of IC 8038 function generator. (16)

Or

(b) (i) Mention the different configurations of a switching regulator. Draw any one basic block diagram and discuss its operation in detail. (8)

(ii) With a neat schematic diagram, describe a monolithic IC Audio power amplifier (LM 380). State its advantages over conventional power amplifiers. (8)