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**Reg. No. :**

**Question Paper Code: 44034**

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2017

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. The active components in an Integrated Circuits (IC’s) are

(a) Resistors (b) Capacitors (c) Transistors and Diodes (d) None of these

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. The ideal op-amp has the following characteristics

(a) *Ri = ∞, A =∞, R0 = 0* (b) *Ri = 0, A =∞, R0 = 0* (c) *Ri = ∞, A =∞, R0 = ∞*  (d) *Ri = 0, A =∞, R0 =∞*

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. In the Voltage Controlled Oscillator (VCO) circuit, the various parameters are R=10 kΩ, C=1.25 nF, VUT=10 V and VLT = 0 V. If input is changed from 10 mV to 10 V, the range of the output frequency can be varied from

(a) 10 Hz to 10 kHz (b) 100 Hz to 10 kHz (c) 10 Hz to 100 kHz (d) 10 kHz to 100 kHz

8. How many Vcc 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. An inverting amplifier has RF= 500 k ohm and R1=5 k ohm. Determine the amplifier circuit voltage gain, input resistance and output resistance. Determine also the output voltage and input current if the input voltage is 0.1 V. Assume Op-amp to be ideal one.

13. List the importance features of an instrumentation amplifier.

14. Give the applications of multiplier IC.

15. Give the drawbacks of linear regulators.

PART - C (5 x 16 = 80 Marks)

16. (a) Explain in detail about monolithic IC technology. (16)

Or

(b) Explain the fundamental method of monolithic IC technology. (16)

17. (a) (i) Explain the characteristics of an ideal op-amp. (8)

(ii) Derive the input bias current equation for an op-amp. (8)

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) Design a 3 bit *R*-2*R* ladder DAC and also draw the equivalent circuit diagram. (16)

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

Or

(b) Draw the block schematic diagram of PLL IC NE/SE 565and describe its functions. (16)

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

Or

(b) (i) Describe the operation of isolation amplifiers. (6)

(ii) Explain the operation of opto-coupler. (10)