**R13**

**Code No: 115AH**

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**
**B. Tech III Year I Semester Examinations, November/December - 2018**
**IC APPLICATIONS**
**(Electrical and Electronics Engineering)**

**Time: 3 hours** **Max. Marks: 75**

**Note:** This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

**PART - A**

**(25 Marks)**

| | | |
|---|---|---|
| 1.a) | Define Monolithic and Hybrid IC Technologies. | [2] |
| b) | What are the advantages of ICs over discrete circuits? | [3] |
| c) | Define Input and Output Offset-voltages. | [2] |
| d) | Compare Open loop and Closed loop configurations of Op-Amp. | [3] |
| e) | What is the use of VCO? | [2] |
| f) | Compare $1^{st}$ order Low Pass and High Pass filters. | [3] |
| g) | Draw the block diagram for PLL. | [2] |
| h) | Distinguish between Astable and Monostable Multi-vibrators. | [3] |
| i) | Which is the fastest ADC and why? | [2] |
| j) | For a particular 8-bit ADC, the conversion time is 9 µs. Find the maximum frequency of an input sine wave that can be digitized. | [3] |

**PART - B**

**(50 Marks)**

2.a) Draw 2-input TTL NAND gate and explain its operation with the help of functional table.
b) Draw the CMOS transmission gate and realize a 2×1 MUX using this transmission gate. [5+5]

**OR**

3.a) Draw the CMOS circuit diagram of Tri-State Buffer? Explain the circuit with the help of logic diagram and function table.
b) What is the necessity of separate interfacing circuit to connect CMOS gate to TTL gate? Draw the interface circuit and explain the operation? [5+5]

4. Draw the circuit and explain the operation of Instrumentation Amplifier. Derive the expression for its output voltage. [10]

**OR**

5.a) An Op-Amp has a differential gain of 80 dB and CMRR of 95 dB. If $V_1$=2 µV and $V_2$ = 1.6 µV, then calculate differential and common mode output values.
b) Explain the principle of operation of Sample and Hold circuit. [5+5]

6. Draw the basic circuit of RC - Phase Shift Oscillator and explain its operation. Also derive the expression for frequency of Oscillation. [10]

**OR**

7.a) Design first order high pass filter with a cut off frequency of 10 KHz with a pass band gain of 1.5.

b) Explain various types of filters along with their frequency response. [5+5]

8.a) Derive the expression for the Duty cycle of an Astable Multi-vibrator using IC555.

b) Compare and contrast Schmitt trigger and Comparator. [6+4]

**OR**

9.a) Derive an expression for Capture Range of PLL.

b) Show that the Lock-in Range of a PLL is given by $Af_L = \pm 7.8f_o/V$, Where the symbols used have the usual meaning. [5+5]

10.a) Find the Resolution of 12-bit D/A Converter.

b) An 8-bit Successive Approximation ADC is driven by a 1 MHz clock. Find its Conversion time. [5+5]

**OR**

11.a) Obtain an expression for the output voltage of R-2R DAC.

b) Explain how Dual Slope A/D converter provides Noise rejection. [5+5]

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