**17EC3104 – ANALOG IC APPLICATIONS**

(Common to ECE and EEE)

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| **Course category:** | Professional core | **Credits:** | 3 |
| **Course Type:** | Theory | **Lecture - Tutorial - Practical:** | 2 - 2 - 0 |
| **Pre-requisite:** | Circuit & Networks,  Electronic Devices & Circuits, Pulse & Analog Circuits | **Sessional Evaluation :**  **External Evaluation:**  **Total Marks:** | 40  60  100 |

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| **Course**  **Objectives** | Students undergoing this course are expected to learn: | |
| 1. The basic building blocks of Op-amp & its characteristics. 2. The linear and non-linear applications of operational amplifiers. 3. The design of multivibrators and various filters using op amp. 4. The theory and applications of 555 timer and P.L.L. 5. The design of filters and regulators. 6. The design of A.D.C.s and D.A.C.s. | |
| **Course Outcomes** | Upon successful completion of the course, the students will be able to understand: | |
| **CO1** | The various applications of the integrated circuits. |
| **CO2** | The importance of operational amplifier. |
| **CO3** | The generation of different waveforms using multivibrators. |
| **CO4** | The working principles of 555 timer and PLL. |
| **CO5** | The design of filters and regulators. |
| **CO6** | The interfacing of ADCs and DACs. |
| **Course**  **Content:** | **UNIT – I**  **Operational amplifier :** Introduction to ICs, op-amp ideal characteristics, internal circuit, D.C and A.C characteristics of op-amp, inverting and non-inverting modes of operation, voltage follower, summer, adder-subtractor, integrator and differentiator  **UNIT – II**  **Operational amplifier applications:** Differential amplifier and its transfer characteristics, derivation of C.M.R.R. & improvement methods of differential amplifier characteristics, instrumentation amplifier, V-I and I-V converters, precision rectifiers, sample and hold circuit, analog computation.  **UNIT – III**  **Comparators and waveform generators:** Comparator, regenerative comparator, Astable and mono stable multivibrators using op-amp, triangular wave generator, sine wave generators using op-amp (R.C. phase shift).  **UNIT – IV**  **IC timers:** 555 Timer, Astable and monostable modes.  **Phase locked loops:** Basic principles, lock and capture range, voltage control oscillator (I.C.-566), PLL (I.C.-565) and P.L.L applications.  **UNIT – V**  **Active filters:** Low-pass, high-pass and band-pass filters, state variable filters.  **Voltage regulators:** Series op-amp regulator, IC voltage regulators, IC723 regulator, switching regulators.  **UNIT – VI**  **Electronic data converters:** Introduction, DAC.s, weighted resistor, R-2R and inverted R-2R.  **Types of ADCs:** Parallel comparator type, counter type, successive approximation and dual slope ADCs, specifications of DAC and ADC. | |
| **Text books**  **&**  **Reference books** | **Text books:**  1.“Linear integrated circuits”, by D. Roy Choudary, Shail B. Jain, New Age  International Publishers, 2003.  2.“Design of analog integrated circuits”, by Sergio Franco.  **Reference books:**  1."Applications and design with analog integrated circuits", by J. Michael Jacob,  PHI, EEE, 1997.  2."Op-amps and linear integrated circuits", by Ramkant A. Gayakwad, LPE,  4th Edition, Pearson Education. | |
| **e-Resources** | 1.http://www.nptel.ac.in  2. http:/www.ebookee.com/linearintegratedcircuits. | |