**20EC2202 – ANALOG IC APPLICATIONS**

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| **Course category:** | Program core | **Credits:** | 3 |
| **Course Type:** | Theory | **Lecture - Tutorial - Practical:** | 2 - 1 - 0 |
| **Prerequisite:** | Circuit & Networks,  Electronics Devices & Circuits and  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: | |
| 1. Learn the basic building blocks of Op-amp & its characteristics. 2. Study linear and non-linear applications of operational amplifiers. 3. Design Multivibrators. 4. Understand the theory and applications of 555 timer and P.L.L. 5. Design of various filters using op amp. 6. Learn theory of A.D.C.s and D.A.C.s. | |
| **Course Outcomes** | Upon successful completion of the course , the students will be able to: | |
| CO1 | Gain the basics of op-amp characteristics and its applications. |
| CO2 | Study and analyse each building blocks of op-amp and its applications. |
| CO3 | Analyse and design of Multivibrators, Oscillators and comparators using op-amp. |
| CO4 | Illustrate and design of Multi-vibrators using 555 timer, understand of PLL and its applications. |
| CO5 | Analyze and design of Active filters and regulators. |
| CO6 | Apply and Analyze A/D and D/A converters and their applications. |
| **Course**  **Content**  **Course**  **Content** | **UNIT – I**  **OPERATIONAL AMPLIFIER :** Introduction to I.C.s, Op-Amp Ideal Characteristics, DC & AC Characteristics, Internal Circuit, Inverting and Non-Inverting Modes of Operation, Differential Amplifier and its Transfer Characteristics, Derivation of C.M.R.R. & Improvement Methods of Differential Amplifier Characteristics  **UNIT – II**  **OPERATIONAL AMPLIFIER APPLICATIONS:**  Summer, Integrator, Differentiator, Voltage Follower, Instrumentation Amplifier, V-I and I-V Converters, Precision Rectifiers, Analog multiplier (AD 534 IC)  **UNIT – III**  **COMPARATORS AND WAVEFORM GENERATORS:** Comparator, Regenerative Comparator, Astable and Mono stable Multi-vibrators using Op-Amp, Sine Wave Generators using Op-Amp (R.C. Phase Shift oscillator).  **UNIT – IV**  **IC TIMERS:** 555 Timer, Astable and Monostable Modes (without applications).  **PHASE LOCKED LOOPS:** Basic Principle, First and Second order PLL concepts.  **UNIT – V**  **ACTIVE FILTERS:** Low Pass, High Pass, Band Pass and State Variable Filters.  **VOLTAGE REGULATORS:** Series Op-Amp Regulator, I.C. Voltage Regulators 78XX, I.C.-723 Regulator, Switching Regulators, Step up and step down regulators (buck & boost).  **UNIT – VI**  **ELECTRONIC DATA CONVERTERS:** Introduction,  D.A.C.s-Weighted Resistor, R-2R.  A.D.C.s-Parallel Comparator Type, Successive Approximation and Dual Slope. | |
| **Text Books and Reference Books** | **TEXT BOOKS:**   1. D. Roy Choudary, Shail B. Jain, "Linear Integrated Circuits", New Age International Publishers, 5th edition 2018. 2. Sergio Franco's “Design With Operational Amplifiers and Analog Integrated Circuits”, 4th edition, 2016.   **REFERENCE BOOKS:**   1. J. Michael Jacob, "Applications and Design with Analog Integrated Circuits", PHI, EEE, 2nd edition, 1996. 2. Ramkant A. Gayakwad, "Op-Amps and Linear Integrated Circuits", LPE, Pearson Education, 4th Edition, 2015 | |
| **E-Resources** | 1. http://www.nptel.ac.in 2. http:/www.ebookee.com/linearintegratedcircuits. | |

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| Contribution of Course Outcomes towards achievement of Program Outcomes (3-High, 2-Medium, 1-Low) | | | | | | | | | | | | | | |
|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
| CO1 | 3 | 3 | 2 | 2 | 1 | - | - | 1 | - | 2 | - | 2 | 3 | 3 |
| CO2 | 3 | 3 | 2 | 2 | 1 | - | - | 1 | - | 2 | - | 2 | 3 | 3 |
| CO3 | 3 | 3 | 3 | 1 | 1 | - | - | 1 | - | 2 | - | 2 | 3 | 3 |
| CO4 | 3 | 3 | 2 | 2 | 1 | - | - | 1 | - | 2 | - | 2 | 3 | 3 |
| CO5 | 3 | 3 | 2 | 2 | 1 | - | - | 1 | - | 2 | - | 2 | 3 | 3 |
| CO6 | 3 | 3 | 2 | 2 | 1 | - | - | 1 | - | 2 | - | 2 | 3 | 3 |