|  |  |
| --- | --- |
|  | **NAGARJUNA COLLEGE OF ENGINEERING & TECHNOLOGY**  **(An Autonomous under VTU)**  **DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGG.**  4th Semester 2019-2020  **COURSE HANDOUT** |

**Course Code :** 18ECI451

**Course Title :** Linear IC’s and Applications(IC)

**Course Teachers :** Mr.Vinaya Kumar S R

**Course Co-ordinator :** Mr.Vinaya Kumar S R

**1. COURSE DESCRIPTION:**

This Course covers the fundamental principles ofLinear IC’s and Applications. The main topics covered are OP-AMP basics, OP-AMP as DC amplifiers, OP-AMPas AC amplifiers,OP-AMP applications, Basic filters and 555 timers.

**2. COURSE OBJECTIVE:**

* The use of op amp in DC and AC applications.
* The concepts of practical OP-AMP specifications, characteristics, biasing of OP-AMPs.
* The frequency response and bandwidth performance of practical OP-AMP.
* The concept of 555 timer, PLL and its applications

**3. COURSE PLAN:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Class Sl No** | **Module and Title / Page No.** | **Topics to be covered** | **% of portions covered** | |
| **Covered in the chapter** | **Cumulative** |
|  | **Module I**  **Introduction to Error control Coding**  **T1: Page No.**  1-65.  **R2:** Page No.  1-21. | Basic OP-AMP circuit, | 20% | 20% |
|  | OP-AMP parameters: Input and Output voltage, CMRR and PSRR, |
|  | Offset voltages and currents, Input and Output impedances, |
|  | Slew rate and Frequency limitations. |
|  | OP-AMPs as DC Amplifiers : Biasing OP-AMPs |
|  | Direct coupled -Voltage Followers |
|  | Non-inverting Amplifiers, Inverting amplifiers |
|  | Summing amplifiers and Difference amplifier |
|  | **Module II**  **Binary Cyclic Codes**  **T1:** Page No.  67- 88  **R2:** Page No.  188-195. | OP-AMPs as AC Amplifiers : Capacitor coupled Voltage Follower | 20% | 40% |
|  | High input impedance-Capacitor coupled Voltage Follower |
|  | Capacitor coupled Non-inverting Amplifiers |
|  | High input impedance - Capacitor coupled Non-inverting Amplifiers |
|  | Capacitor coupled Inverting amplifiers |
|  | setting the upper cut-off frequency |
|  | Capacitor coupled Difference amplifier |
|  | Use of a single polarity power supply |
|  | **Module III**  **Convolution Codes**  **T1:** Page No.  90-130  **R1:** Page No.  274-288. | OP-AMPs frequency response and compensation | 20% | 60% |
|  | Circuit stability, |
|  | Frequency and phase Response |
|  | Frequency compensating methods |
|  | Band width, Slew rate effects |
|  | Zin Mod compensation |
|  | Circuit stability precautions |
|  | OP-AMPs frequency response and compensation |
|  | **Module IV**  **Source Coding**  **T2:** Page No.  207-308.  **T2:** Page No.  249-294. | OP-AMP Application : Current amplifiers | 20% | 80% |
|  | Precision rectifiers, Clamping circuits |
|  | Peak detectors, sample and hold circuits |
|  | Log and antilog amplifiers, Multiplier and divider,Triangular / rectangular wave generators |
|  | Non-linear circuit applications of OP-AMP: Crossing detectors |
|  | Inverting Schmitt trigger circuits, |
|  | Mono-stable and A-stable multivibrator, |
|  | Active Filters: First and Second order Low pass and High pass filters. |
|  | **Module V**  **Information Theory**  **T2:** Page No.  311-366.  **R2** Page No.  314-379 | Other Linear IC applications: 555 timer | 20% | 100% |
|  | Basic timer circuit |
|  | 555 timer used as a stable and Mono-stable multivibrator |
|  | Schmitt trigger; PLL: Operating principles |
|  | Phase detector / Comparator |
|  | D/A and A/ D converters: Basic DAC Techniques |
|  | AD converters |
|  | IC 723 general purpose Regulator |

**4. TEXT BOOK:**

**T1.**David A. Bell: “Operational Amplifiers and Linear IC’s”, 2nd Edition, (Chapters 1-4), PHI/Pearson, 2008, ISBN: 9788120323599.

**T2.**D. Roy Choudhury and Shail B. Jain: “Linear Integrated Circuits”, 4th Edition, (Chapter 5), New Age International, 2010, ISBN: 9788122430981.

**5. REFERENCE BOOKS:**

**R1.**Robert F. Coughlin and Fred F. Driscoll: “Operational Amplifiers and Linear Integrated Circuits”, 6th Edition, PHI/Pearson, 2001, ISBN: 8120320964.

**R2.**Ramakant A. Gayakwad: “OP-AMPs and Linear Integrated Circuits”, 4th Edition, PHI/Pearson, 2000, ISBN: 8120320581.

**6. EVALUATION SCHEME:**

|  |  |  |
| --- | --- | --- |
| **Component** | **Weightage** | **Date** |
| CIE 1 | 10% |  |
| CIE 2 | 10% |  |
| Make Up CIE | 10% |  |
| AAT 1 ((open book test) | 5% |  |
| AAT 2(Quiz) |  |
| Integrated LAB | 25% |  |
| SEE | 50% |  |

**7. COURSE OUTCOMES:**

On successful completion of this module, students should be able to:

* Describe the practical OP-AMP specifications and characteristics.
* Determine OP-AMP as AC amplifiers.
* Analyzing stability condition of OP-AMP.
* Analyzing OP-AMP linear and non linear applications.
* Analyzing of 555 timers, PLL and their applications.

**Course Teachers HOD**

Mr.Vinaya Kumar S R Dr. Nagesh K N