# Course Information Sheet

| | | |
|---|---|---|
| Programme:**UG** | Degree: **B.Tech (ECE)** | |
| Course Code: **C311 (R2031041)** | Course Title: **ANALOG ICs AND APPLICATIONS** | |
| Year: **III** Sem: **I**<br>A.Y. :**2024-25** | Regulation: **R20**<br>University: **JNTU Kakinada**. | |
| L T/P/D C: **3/0/0/3** | Credits**: 3** | Contact Hrs**: 4** |
| Mid Marks**: 30** | External Marks**: 70** | Total Marks**: 100** |
| Teaching Hrs: **65** | Exam Duration**: 3 hrs.** | |

**Course Pre-Requisites:** 1. Electronic Devices & Circuits 2. Switching Theory and Logic 3. Electronic Circuit Analysis.

| Course Code | Course Name | Description | Year-Sem |
|---|---|---|---|
| C311<br>(R2031041) | ANALOG ICs AND APPLICATIONS | Integrated Circuits design can be divided into the broad categories of digital and analog IC design. The physical world is inherently analog indicating that there is always need for analog circuitry. Today the growth of any industry is dependent upon electronics to a great extent. Integrated circuit is electronics and this course IC application acquaints the students with general analog principles and design methodologies using practical devices and applications. It focuses on process of learning about signal condition, signal generation, instrumentation, timing and control using various IC circuitry. With modern digitization advantages we need to work with digital data and hence digital ICs play a crucial role in connecting physical world to the more sophisticated digital world. This course focuses on analysis, design and applications of modern digital integrated circuits | III ECE<br>Semester -1 |

## Course outcomes:

**Student will able to**

| No. | Description | Skill /Bloom's Taxonomy Level |
|---|---|---|
| **CO1** | Describe the Op-Amp and internal Circuitry: 555 Timer, PLL | Remember<br>Understand<br>TL1/TL2 |
| **CO 2** | Discuss the Applications of Operational amplifier Using IC741 | Remember<br>Understand<br>TL1/TL2 |
| **CO 3:** | Design the Active filters using Operational Amplifier | Create /TL4 |
| **CO4** | Design the 555 timer, Multivibrators and applications, Schmitt Trigger. Phase Locked Loops | Design/TL 6 |
| **CO5** | Use the Op-Amp in A to D & D to A Converters | Apply/TL3 |

## Course Articulation Matrix:

**Mapping of Course Outcomes (CO) with Program Outcomes (PO) and Program Specific Outcomes (PSO's):**

| Course Outcomes (CO) | Program Outcomes (PO) | | | | | | | | | | | | Program Specific Outcomes (PSO's) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO1** | **PO 2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| **CO1** | 3 | 3 | 1 | - | - | - | - | - | - | - | - | 2 | 2 | 2 |
| **CO 2** | 3 | 1 | 1 | - | - | - | - | - | - | - | - | 2 | 2 | 2 |
| **CO 3** | 3 | 2 | 2 | 1 | - | - | - | - | - | - | - | 2 | 2 | 2 |
| **CO4** | 3 | 2 | 2 | 2 | - | - | - | - | - | - | - | 2 | 2 | 2 |
| **CO5** | 2 | 2 | 1 | 1 | - | - | - | - | - | - | - | 2 | 2 | 2 |
| Overall | **2.8** | **2** | **1.4** | **1.3** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **2** | **2** | **2** |

**Level:** 1- Low correlation (Low), 2- Medium correlation (Medium), 3-High correlation (High)

## Syllabus / Lesson Plan:

| S.No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | TB and Page Number |
|---|---|---|---|---|---|---|
| **UNIT-1** | | | | | | |
| 1 | OP-Amp Block Diagram (Symbolic Representation) | 1 | 01-08-2024 | 01-08-2024 | Chalk & Talk | TB-1 |
| 2 | Characteristics of Op-Amp, Ideal and Practical | 1 | 03-08-2024 | 03-08-2024 | Chalk & Talk | TB-1 |
| 3 | Op-Amp specifications | 1 | 04-08-2024 | 04-08-2024 | Chalk & Talk | TB-1 |
| 4 | DC and AC Characteristics, Definitions of Input and Output | 1 | 05-08-2024 | 05-08-2024 | Chalk & Talk | TB-1 |
| 5 | Off-set voltage and currents slow rate CMRR, PSRR. | 1 | 06-08-2024 | 06-08-2024 | Chalk & Talk | TB-1 |
| 6 | Measurements of Op-Amp Parameters, Three- | 1 | 08-08-2024 | 08-08-2024 | Chalk & Talk | TB-1 |
| 7 | Terminal Voltage Regulators 78xx& 79xx Series | 1 | 10-08-2024 | 10-08-2024 | Chalk & Talk | TB-1 |
| 8 | current Booster, adjustable voltage, | 1 | 11-08-2024 | 11-08-2024 | Chalk & Talk | TB-1 |
| 9 | DualPowerSupplywith78xx&79xx | 1 | 12-08-2024 | 12-08-2024 | Chalk & Talk | TB-1 |
| 10 | class test on Unit -1 | 1 | 13-08-2024 | 13-08-2024 | PAPER TEST | |
| **UNIT-2** | | | | | | |
| 11 | Introduction | 1 | 17-08-2024 | 17-08-2024 | Chalk & Talk | TB-1 |
| 12 | Basic Op-Amp Applications | 1 | 18-08-2024 | 18-08-2024 | Chalk & Talk | TB-1 |
| 13 | Instrumentation Amplifier, AC Amplifier | 1 | 20-08-2024 | 20-08-2024 | Chalk & Talk | TB-1 |
| 14 | V to I and I to V Converter | 1 | 22-08-2024 | 22-08-2024 | Chalk & Talk | TB-1 |
| 15 | Sample and Hold Circuit | 1 | 24-08-2024 | 24-08-2024 | Chalk & Talk | TB-1 |
| 16 | Log and Antilog Amplifier | 1 | 25-08-2024 | 25-08-2024 | Chalk & Talk | TB-1 |
| 17 | Multiplier and Divider | 1 | 26-08-2024 | 26-08-2024 | Chalk & Talk | TB-1 |
| 18 | Differentiator, integrator. | 1 | 27-08-2024 | 27-08-2024 | Chalk & Talk | TB-1 |
| 19 | Introduction to Comparator | 1 | 29-08-2024 | 29-08-2024 | Chalk & Talk | TB-1 |
| 20 | Waveform Generators: | 1 | 01-09-2024 | 01-09-2024 | Chalk & Talk | TB-1 |
| 21 | Square Wave Generator | 1 | 02-09-2024 | 02-09-2024 | Chalk & Talk | TB-1 |
| 22 | Monostable Multivibrator | 1 | 03-09-2024 | 03-09-2024 | Chalk & Talk | TB-1 |
| 23 | Triangular Wave Generator,Sine Wave Generators. | 1 | 05-09-2024 | 05-09-2024 | Chalk & Talk | TB-1 |
| 24 | Revision on unit-2 | 1 | 07-09-2024 | 07-09-2024 | PPT | |
| 25 | class test on Unit -2 | 1 | 08-09-2024 | 08-09-2024 | PAPER TEST | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **UNIT-3** | | | | | | |
| 26 | Active Filters | 1 | 09-09-2024 | 09-09-2024 | Chalk & Talk | TB-1 |
| 27 | Design & Analysis of Butterworth active filters | 1 | 10-09-2024 | 10-09-2024 | Chalk & Talk | TB-1 |
| 28 | 1st order Active Filters | 1 | 12-09-2024 | 12-09-2024 | Chalk & Talk | TB-1 |
| 29 | 2nd order LPF. | 1 | 14-09-2024 | 14-09-2024 | Chalk & Talk | TB-1 |
| 30 | HPF filters. | 1 | 15-09-2024 | 15-09-2024 | Chalk & Talk | TB-1 |
| 31 | Band pass | 1 | 16-09-2024 | 16-09-2024 | Chalk & Talk | TB-1,R2 |
| 32 | Notch filter | 1 | 17-09-2024 | 17-09-2024 | Chalk & Talk | TB-1,R2 |
| 33 | Band reject | 1 | 19-09-2024 | 19-09-2024 | Chalk & Talk | TB-1 |
| 34 | All pass filter | 1 | 21-09-2024 | 21-09-2024 | Chalk & Talk | TB-1 |
| 35 | Comparision of all filters | 1 | 22-09-2024 | 22-09-2024 | PPT | |
| 36 | Revision on unit-3 | 1 | 23-09-2024 | 23-09-2024 | PPT | |
| 37 | class test on Unit -3 | 1 | 24-09-2024 | 24-09-2024 | PAPER TEST | |
| **UNIT-4** | | | | | | |
| 38 | Timers: Introduction to 555 timer, functional diagram | 1 | 10-10-2024 | | Chalk & Talk | TB-1 |
| 39 | Monostable and Astable operations and applications | 1 | 12-10-2024 | | Chalk & Talk | TB-1 |
| 40 | Schmitt Trigger. | 1 | 13-10-2024 | | Chalk & Talk | TB-1 |
| 41 | Phase Locked Loops: Introduction, block schematic | 1 | 14-10-2024 | | Chalk & Talk | TB-1,R1 |
| 42 | principles and description of individual blocks | 1 | 15-10-2024 | | Chalk & Talk | TB-1,R1 |
| 43 | 565 PLL, Applications of PLL | 1 | 17-10-2024 | | Chalk & Talk | TB-1 |
| 44 | Frequency multiplication | 1 | 19-10-2024 | | Chalk & Talk | TB-1 |
| 45 | Applications of VCO (566) | 1 | 20-10-2024 | | Chalk & Talk | TB-1 |
| 46 | Revision on unit-4 | 1 | 21-10-2024 | | PPT | |
| 47 | class test on Unit -4 | 1 | 22-10-2024 | | PAPER TEST | |
| **UNIT-5** | | | | | | |
| 48 | Introduction | 1 | 26-10-2024 | | Chalk & Talk | TB-1 |
| 49 | Basic DAC techniques | 1 | 27-10-2024 | | Chalk & Talk | TB-1,R1 |
| 50 | Weighted resistor DAC | 1 | 28-10-2024 | | Chalk & Talk | TB-1,R1 |
| 51 | R-2R ladder DAC | 1 | 29-10-2024 | | Chalk & Talk | TB-1,R1 |
| 52 | Inverted R-2R DAC, A-D Converters | 1 | 31-10-2024 | | Chalk & Talk | TB-1,R1 |
| 53 | Parallel Comparator type ADC | 1 | 02-11-2024 | | Chalk & Talk | TB-1 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 54 | Counter type ADC | 1 | 03-11-2024 | | Chalk & Talk | TB-1 |
| 55 | Successive approximation ADC | 1 | 04-11-2024 | | Chalk & Talk | TB-1 |
| 56 | Dual slope ADC. | 1 | 05-11-2024 | | Chalk & Talk | TB-1 |
| 57 | DAC and ADC Specifications. | 1 | 07-11-2024 | | Chalk & Talk | TB-1 |
| 58 | Revision on unit-5 | 1 | 09-11-2024 | | PPT | |
| 59 | class test on Unit -5 | 1 | 10-11-2024 | | PAPER TEST | |

**Text books (T) / Reference books (R)/Additional text books (A):**

| T/R/A | Book Title/Author/Publication |
|---|---|
| **T1** | Linear Integrated Circuits – D. Roy Choudhury, New Age International (p) Ltd, 2nd Edition 2003. |
| **T2** | Operational Amplifiers & Linear Integrated Circuits –Sanjay Sharma ;SK Kataria&Sons;2nd Edition,2010 |
| **R1** | Op-Amps & Linear ICs - Ramakanth A. Gayakwad, PHI, 1993 |
| **R2** | Operational Amplifiers & Linear ICs – David A Bell, Oxford Uni. Press, 3rd Edition. |

## Web References:

| W | Web References |
|---|---|
| **W1** | https://www.youtube.com/watch?v=oZj7iI9zVH4 |
| **W2** | https://www.youtube.com/playlist?list=PLtmB4Xi1QiUB_IdBMnZnFJa416Wt3xdUP |
| **W3** | https://archive.nptel.ac.in/courses/108/108/108108111/ |

**ASSESSMENT METHODOLOGIES-DIRECT**

| | | | |
|---|---|---|---|
| ☑ASSIGNMENTS | ☑ STUD. SEMINARS | ☑TESTS/MODEL EXAMS | ☑UNIV. EXAMINATION |
| ☐ STUD. LAB PRACTICES | ☐ STUD. VIVA | ☐ MINI/MAJOR PROJECTS | ☐ CERTIFICATIONS |
| ☐ ADD-ON COURSES | ☐ OTHERS | | |

**ASSESSMENT METHODOLOGIES-INDIRECT**

| | |
|---|---|
| ☑ ASSESSMENT OF COURSE OUTCOMES (BY FEEDBACK, ONCE) | ☑ STUDENT FEEDBACK ON FACULTY (TWICE) |
| ☐ ASSESSMENT OF MINI/MAJOR PROJECTS BY EXT. EXPERTS | ☐ OTHERS |

**Prepared by** **Approved by**