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# B.M.S. College of Engineering, Bengaluru-560019

**Autonomous Institute Affiliated to VTU**

## August 2024 Semester End Main Examinations

**Programme: B.E.** **Semester: IV**
**Branch: Cluster (EIE/MD)** **Duration: 3 hrs.**
**Course Code: 22ES4PCLIC** **Max Marks: 100**
**Course: Linear Integrated Circuits**

**Instructions**: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

REAPPEAR EXAMS 2023-24

**Important Note:** Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

| | | MODULE - I | CO | PO | Marks |
|---|---|---|---|---|---|
| 1 | a) | Explain the Internal block diagram of OP-amp and mention the advantages of Op-amp. | CO1 | PO1 | **10** |
| | b) | With the circuits, explain the principle of voltage to current and Current to Voltage converters. | CO2 | PO2 | **10** |
| | | **OR** | | | |
| 2 | a) | Discuss the DC and AC Characteristics of Op amp. | CO1 | PO1 | **10** |
| | b) | With a neat diagram, explain the working principal of Instrumentation Amplifier and mention features of instrumentation amp. | CO2 | PO2 | **10** |
| | | **MODULE - II** | | | |
| 3 | a) | With a neat circuit, explain the working principle of RC phase-shift oscillators and write the Expression for a Frequency. | CO2 | PO2 | **08** |
| | b) | Explain the operation of a Op amp Monostable multivibrator with relevant circuit diagram and waveforms. | CO2 | PO2 | **08** |
| | c) | Design an Op Amp astable multivibrator circuit to obtain a square waveform of amplitude = 10V, frequency = 2kHz and D=50%. | CO2 | PO3 | **04** |
| | | **MODULE - III** | | | |
| 4 | a) | Explain op amp Differentiator and Integrator, with relevant circuit, waveforms and its applications. | CO2 | PO2 | **12** |
| | b) | Design a first-order low-pass filter to give a high cutoff frequency of fo =1 kHz with a pass-band gain of 4.<br>If the desired frequency is changed to fn= 1.5 kHz, calculate the new value of Rn. | CO2 | PO3 | **08** |

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| | | | **MODULE - IV** | | | |
| | 5 | a) | Implement an R-2R ladder Digital to Analog converter, and obtain an expression to relate the analog output voltage with the digital input. Show the analysis for a minimum of 2 nodes of the ladder. | *CO2* | *PO2* | **10** |
| | | b) | A 5-bit D/A converter produces $V_{out}$ = 0.2 V for a digital input of 0001.Find the value of $V_{out}$ for an input of 11111. | *CO2* | *PO3* | **05** |
| | | c) | Assume $V_{REF}$ = 10 V and R = R = 10 kΩ. Determine the resolution and full scale output for the DAC. Assume that $R_L$ is much smaller than R. | *CO2* | *PO3* | **05** |
| | | | **OR** | | | |
| | 6 | a) | Discuss the applications of DACs and ADCs. | *CO2* | *PO1* | **06** |
| | | b) | With the block diagram, explain the working principle of Successive Approximation ADC. | *CO2* | *PO2* | **10** |
| | | c) | A 4-bit R-2R digital-to-analog converter is constructed to control the speed of a small DC motor using the output from a digital logic circuit. If the logic circuit uses 10 volt CMOS devices, calculate the analogue output voltage from the DAC when the input code is hexadecimal number "B". Also determine the resolution of the DAC. | *CO3* | *PO3* | **04** |
| | | | **MODULE - V** | | | |
| | 7 | a) | With the block diagram, explain the working principle Voltage Controlled Oscillator. | *CO2* | *PO3* | **08** |
| | | b) | Explain the working principle of PLL with relevant circuits and mention its applications. | *CO2* | *PO3* | **12** |

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REAPPEAR EXAMS 2023-24