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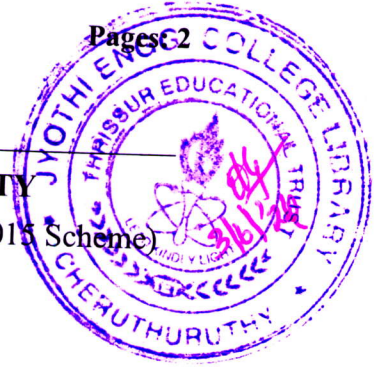
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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S4 (S,FE) / S2 (PT) (S,FE) Examination May 2024 (2015 Scheme)



Course Code: EC204

Course Name: ANALOG INTEGRATED CIRCUITS (AE, EC)

Max. Marks: 100

Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks.

Marks

- 1 a) Define the following parameters of an op-amp. (6)
 - i. CMRR
 - ii. Slew Rate
 - iii. Offset voltage
- b) Analyse voltage series feedback amplifier for closed loop voltage gain, input resistance with feedback and output resistance with feedback. (9)
- 2 a) Design an inverting adder circuit using op-amp to get the output voltage as (8)
$$V_o = -(0.1V_1 + V_2 + 10V_3)$$
, where V_1 , V_2 and V_3 are the inputs.
- b) Analyse an averaging circuit using op-amp for the output voltage. (7)
- 3 a) Draw the block diagram and equivalent circuit of an operational amplifier. (7)

Explain ideal voltage transfer characteristics of an operational amplifier.
- b) Draw the block diagram and circuit diagram of a differential instrumentation amplifier with a transducer bridge and show that the output voltage is proportional to the change in resistance. (8)

PART B

Answer any two full questions, each carries 15 marks.

- 4 a) Illustrate the working of precision full wave rectifier with neat diagram. (5)
- b) Analyse an integrator and write down the expression for output voltage. (5)
- c) A sinusoidal signal with peak value of 10mV and 1 KHz frequency is applied to the input of an ideal integrator with $R_{IN} = 100k\Omega$ and $C_F = 1\mu F$. Find the output voltage. (5)
- 5 a) Explain RC phase shift oscillator with circuit diagram and derive the expression for frequency of oscillation. (10)

- b) Illustrate Log Amplifier and derive the output voltage. (5)
- 6 a) Design a second order Butterworth active low pass filter for a high cut-off frequency of 500Hz and pass band voltage gain of 1.586. (7)
- b) Explain the working of astable multi-vibrator using op-amp with relevant circuit diagram and waveforms. Also, derive an expression for the time period. (8)

PART C

Answer any two full questions, each carries 20 marks.

- 7 a) Explain a monostable multivibrator using 555 IC with internal diagram and relevant waveforms. Derive the expression for pulse width. (8)
- b) Illustrate the principle of operation of PLL with its capture range and lock range. (7)
- c) Determine the free running frequency f_{OUT} , the lock range f_L and the capture range f_C of a PLL circuit using NE 565. Given $\pm V=10V$, $R_1=10K\Omega$, $C_1=0.01\mu F$, $C_2=10\mu F$ and $C_3=0.001\mu F$. (5)
- 8 a) Explain the application of PLL as frequency multiplier. (6)
- b) Illustrate IC723 based voltage regulators. (6)
- c) Explain the working of simultaneous type (flash type) A/D convertor. (8)
- 9 a) Summarize the specifications of D/A convertor. (5)
- b) Explain 4 bit R-2R ladder D/A converter and derive the output voltage. (8)
- c) Illustrate the working of successive approximation type A/D converter. (7)
