



Reg No. _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
 Fourth Semester B.Tech Degree (S,FE) Examination August 2021 (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

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|---|---|------|
| 1 | a) Derive the equation for output voltage for an inverting summer | (4) |
| | b) Explain how the inverting summer can be used as scaling and averaging amplifiers | (8) |
| | c) An inverting summer has the following inputs. $V_1=1V$, $V_2=4V$, $V_3=5V$. Given $R_1=R_2=R_3=2K$ and the supply voltages are $\pm 15V$. Determine the output voltage. Assume that the op amp is initially nulled. | (3) |
| 2 | a) Explain the open loop configurations of 1) Differential Amplifier and 2) Non inverting amplifier | (8) |
| | b) Explain how the output offset voltage is eliminated in operational amplifiers | (4) |
| | c) List the four building blocks of an op amp | (3) |
| 3 | a) Distinguish between regenerative feedback and degenerative feedback | (5) |
| | b) In a non-inverting amplifier using 741 op amp if the open loop voltage gain $A=400,000$, the input resistance without feedback, $R_i=2 M\Omega$, the output resistance without feedback, $R_o=75 \Omega$, band width without feedback, $f_o=5Hz$, output voltage swing $=\pm 13V$. The gain of the feedback circuit is 0.09. Find the value of closed loop voltage gain, input resistance with feedback, output resistance with feedback, bandwidth with feedback, output offset voltage with feedback. | (10) |

PART B*Answer any two full questions, each carries 15 marks.*

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| 4 | a) Explain the working of a triangular wave generator and derive the equation for frequency of oscillation | (11) |
| | b) Design an astable multivibrator for a frequency of 2 KHz using 741 op-amp. Assume the feedback factor, $\beta=0.5$ | (4) |

- 5 a) What are the advantages of active filters? (3)
- b) Derive the equation for gain of a first order low pass Butterworth filter and show how the magnitude of gain varies as a function of frequency. (12)
- 6 a) Explain how Barkhausen criteria is achieved in Wienbridge Oscillators. (7)
- b) Design a differentiator that will differentiate an input signal that varies in frequency from 10 Hz to 100 Hz. (8)

PART C

Answer any two full questions, each carries 20 marks.

- 7 a) Derive the equation for closed loop transfer function for phase locked loop. Find the response of the PLL to frequency variations. (12)
- b) Discuss the application of PLL in frequency synthesizing and in frequency multiplication. (8)
- 8 a) Define drop out voltage of a 7800 regulator. Using the 7805C voltage regulator, design a current source that delivers a 0.25 A current to a 60Ω , 10 W load. (10)
- b) Explain the working of a Successive Approximation type ADC with suitable figures. What are its features? (10)
- 9 a) Explain the working of Single Slope ADC. (6)
- b) Define the following specifications of D/A Converter a) Resolution b) Monotonicity. (4)
- c) Explain how digital signal is converted into analog signal using R-2R ladder type DAC. (10)

