

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
Fourth Semester B.Tech Degree (S,FE) Examination June 2022 (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) Draw a differential pair using BJTs. Explain its operation using small signal and large signal models. | (10) |
| | b) Discuss the use of current sources in the operation of differential amplifiers. | (5) |
| 2 | a) Draw and explain the internal block diagram of an operational amplifier. | (5) |
| | b) List down the parameters of an Op-amp and mention their ideal values. | (5) |
| | c) Explain the importance of negative feedback in Op-amp based circuits, | (5) |
| 3 | a) Draw the circuit of a non-inverting amplifier and derive an expression for its voltage gain. Obtain its input and output resistances. | (9) |
| | b) Design a circuit with inputs V_1 , V_2 and V_3 to get $V_{out} = -(2V_1 + V_2 + 5V_3)$. | (6) |

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

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| 4 | a) With necessary diagrams, explain the working of an active integrator. Derive the expressions for its -3 dB frequency and unity gain frequency. | (11) |
| | b) Explain the working of a logarithmic amplifier. | (4) |
| 5 | a) Draw the circuit diagram, explain the working of a Wien-bridge Oscillator using Op-amp, and derive the expression for its frequency of oscillation. | (10) |
| | b) Design a Wien-bridge oscillator for a frequency of 2 KHz. | (5) |
| 6 | a) Draw the circuit diagram and explain the working of a triangular wave generator. Derive an expression for its output frequency. | (10) |
| | b) Design a triangular wave generator for a frequency of 1 KHz. | (5) |

PART C*Answer any two full questions, each carries 20 marks.*

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| 7 | a) Draw and explain the internal block diagram of IC 555 timer. | (6) |
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- b) Draw the circuit and explain the working of an astable multivibrator using 555. (10)
Derive an expression for its output frequency.
- c) Design an astable multivibrator using 555, for a frequency of 1 KHz with a duty cycle of 50%. (4)
- 8 a) Draw the functional block diagram of PLL and explain its operation. Define the terms lock range, capture range and free running frequency of PLL. (9)
- b) Explain how PLL is used for frequency multiplication? (5)
- c) Draw and explain the functional block diagram of IC 723 voltage regulator. (6)
- 9 a) What are the specifications of data converters? (6)
- b) Draw the schematic and explain the working of a 4-bit weighted resistor D/A converter. (8)
- c) Explain the working of a successive approximation A/D converter.. (6)
