



Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FOURTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018

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) Analyse the BJT differential amplifier pair under large signal operation and illustrate its transfer characteristics. | (8) |
| | b) How to implement the instrumentation amplifier using three Op.Amp. Deduce the condition for ensuring high CMRR in the circuit? | (7) |
| 2 | a) Using the small signal analysis, deduce the expression for CMRR and differential input resistance of the BJT differential amplifier from fundamentals. | (9) |
| | b) What is the principle of operation of Wilson current mirror and its advantages? Deduce the expression for its current gain. | (6) |
| 3 | a) Deduce the expression for the closed loop voltage gain, input resistance and output resistance for an op. amp. with voltage series feed back. | (10) |
| | b) For an op-amp having a slew rate of $2V/\mu\text{sec}$. What is the maximum closed loop voltage gain that can be used when the input signal varies by $0.5V$ in $10\mu\text{sec}$? | (5) |

PART B

Answer any two full questions, each carries 15 marks.

- | | | |
|---|---|------|
| 4 | a) How to realize Wein-Bridge oscillator using op. amp.? Derive the condition of oscillation and frequency of oscillation for the circuit. | (8) |
| | b) Design a circuit to generate 1KHz triangular wave with $5V$ peak. | (7) |
| 5 | a) Illustrate the working principle of the grounded load voltage to current converter and deduce the condition for its ideal current converter. | (8) |
| | b) Design a fullwave rectifier to rectify an ac signal of $0.2V$ peak-to-peak. Explain its principle of operation. | (7) |
| 6 | a) Derive the design equations for a second order Butterworth active low pass filter. | (10) |
| | b) Design a Notch filter to eliminate power supply hum (50 Hz). | (5) |

P.T.O.

PART C

Answer any two full questions, each carries 20 marks.

- 7 a) Design a circuit to convert 1 KHz, 50% duty cyclesquare wave to 1 KHz, 30% duty cycle rectangular wave. (7)
- b) How to configure fold back current limiting protection in 723 voltage regulator IC. Explain the circuit with internal block diagram of the IC. (7)
- c) What is the principle of operation of successive approximation ADC? (6)
- 8 a) Illustrate the principle of operation of PLL with its capture range and lock range (7)
- b) How phase detector is implemented in digital PLL? (5)
- c) Design a circuit to multiply the incoming frequency by a factor of 5 using 565 PLL. (8)
- 9 a) Find out the Dynamic range, Full-scale value and Resolution of a 12 bit DAC having full-scale range 10V. (5)
- b) Explain the working principle of R-2R ladder type DAC with circuit. (6)
- c) What is the principle of operation of Dual slope ADC. Deduce the relationship between analogue input and digital output of the ADC. (9)
