

Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
**THIRD SEMESTER B.TECH DEGREE EXAMINATION, APRIL 2018**

**Course Code: EE203**

**Course Name: ANALOG ELECTRONIC CIRCUITS (EE)**

Max. Marks: 100

Duration: 3 Hours

**PART A**

*Answer all questions, each carries 5 marks*

Marks

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|---|---|-----|
| 1 | (a) Design a suitable circuit to obtain the output level clipped at +3V and -4V for a 10V peak to peak sinusoidal input voltage.                                      | (3) |
|   | (b) What are the factors affecting stability of operating point of a transistor?  | (2) |
| 2 | Draw and explain high frequency hybrid pi model of common emitter transistor.   | (5) |
| 3 | What are the different topologies of feedback amplifiers?   | (5) |
| 4 | (a) What are the properties of an ideal opamp?  | (3) |
|   | (b) State Barkhausen criteria for sinusoidal oscillators.   | (2) |
| 5 | With the help of a circuit diagram show how an opamp is used to get an output as $V_o = V_1 + V_2 - V_3 - V_4$ , Where $V_1, V_2, V_3$ and $V_4$ are inputs to opamp. | (5) |
| 6 | Design an integrator that can integrate a square wave of peak to peak voltage 10V and frequency 1 kHz and draw the output waveform.                                   | (5) |
| 7 | Explain the operation of a square waveform generator using opamp.   | (5) |
| 8 | Design a Wein bridge oscillator to generate a sinusoidal waveform of 1 kHz.   | (5) |

**PART B**

*Answer any two full questions, each carries 10 marks*

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| 9  | (a) Design a voltage divider bias circuit for a NPN transistor with $h_{fe} = 100$ and $V_{BE} = 0.6$ V, to operate from a 12 V dc supply. The bias conditions are $V_{CE} = 6$ V, $V_E = 1.2$ V and $I_C = 2$ mA.   | (5) |
|    | (b) Explain any one compensation technique used for reducing the drift of operating point.   | (5) |
| 10 | (a) Draw the h parameter model of a transistor in CE configuration. Also derive the expression for input impedance, current gain and voltage gain.   | (5) |
|    | (b) h-parameters of a transistor connected in CE configuration is $h_{ie} = 1000 \Omega$ , $h_{re} = 10 \times 10^{-4}$ ; $h_{fe} = 50$ ; $h_{oe} = 100 \times 10^{-6} \Omega$ . If the load resistance $R_L$ is 1 K $\Omega$ , find:<br>i) The input impedance      ii) Current gain      iii) Voltage gain | (5) |
| 11 | (a) Explain the working and characteristics of a N channel MOSFET.   | (6) |
|    | (b) Draw the frequency response of an amplifier. What is the significance of gain bandwidth product?   | (4) |

**PART C**

*Answer any two full questions, each carries 10 marks*

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| 12 | (a) What is harmonics distortion in power amplifier? Discuss the operation of a class | (6) |
|----|---|-----|

- B power amplifier and derive its maximum power conversion efficiency.
- (b) Explain the working of a two stage RC coupled amplifier with circuit diagram. (4)
- 13 (a) Derive the expression for the voltage gain of an opamp based non-inverting amplifier. (5)
- (b) Derive the frequency of oscillation of a RC phase shift oscillator using transistor. (5)
- 14 (a) Write short notes on the following: (4)
- i) CMRR ii) Slew rate
- (b) Explain the operation of Hartley oscillator with a circuit diagram. (6)

**PART D**

*Answer any two full questions, each carries 10 marks*

- 15 (a) Draw and explain the operation of logarithmic amplifier. (5)
- (b) What is the significance of UTP and LTP in Schmitt trigger circuits? Why is it called as regenerative comparator? (5)
- 16 (a) What are the features of instrumentation amplifier? Derive the expression for output voltage of an instrumentation amplifier. (5)
- (b) Draw and explain the operation of a Triangular waveform generator using opamp (5)
- 17 (a) With the help of internal circuit diagram of IC555 explain the operation of a monostable multivibrator. (5)
- (b) Design an astable multivibrator using 555 timer to generate an output signal with frequency 5kHz and 50% duty cycle. (5)

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