Reg No.: Name: $\qquad$

## APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY THIRD SEMESTER B.TECH DEGREE EXAMINATION, MAY 2019 <br> Course Code: CS207 <br> Course Name: ELECTRONIC DEVICES AND CIRCUITS

Max. Marks: 100
Duration: 3 Hours

## PART A <br> Answer all questions, each carries 3 marks.

1 Derive the input- output relationship of an RC integrator circuit.
2 Draw and explain the circuit of a 78XX IC based voltage regulator. Marks

3 Design a loaded 5.1 V zener diode voltage regulator for a load current of 20 mA .
Input voltage is 12 V dc. Assume that zener knee current is 5 mA .
4 Distinguish between
(i) Series and Shunt Clippers
(ii) Positive and Negative Clippers

PART B
Answer any two full questions, each carries 9 marks.
5 a) Draw and explain the circuit of a voltage doubler.
b) With the help of characteristic curves, explain the principle of operation of a Junction Field Effect Transistor. Mark its regions of operation on the curve.
a) Draw and explain the transistorised sweep circuit using a normally off transistor switch.
b) Draw and explain the circuit of a series voltage regulator.

7 a) Design circuits using passive components to perform the following waveform conversions:
(i) 2 KHz triangular wave to square wave
(ii) 0.5 KHz square wave to triangular wave
b) Draw and explain the block diagram of SMPS.

PART C
Answer all questions, each carries 3 marks.
8 Explain thermal runaway in transistors.
9 Draw the circuit of a monostable multivibrator using transistors.
10 Compare BJT and FET.
11 State and explain Barkhausen Criteria.

## PART D

Answer any two full questions, each carries 9 marks.
Design an RC Coupled Amplifier using transistors with the following specifications:
$\mathrm{V}_{\mathrm{cc}}=12 \mathrm{~V} \mathrm{dc}, \mathrm{I}_{\mathrm{c}}=2 \mathrm{~mA}, \mathrm{~h}_{\mathrm{fe}}=125$, Lower cut off frequency $=100 \mathrm{~Hz}$, Upper cut off frequency $=100 \mathrm{KHz}$.

13 a) What are the effects of cascading on the gain and bandwidth of transistor amplifier circuits.
b) Sketch and explain a Wein Bridge Oscillator using transistors. Explain how conditions for sustained oscillations are satisfied in this circuit.

14 With neat sketches and waveforms, explain the working of an Astable Multivibrator using transistors.

## PART E

## Answer any four full questions, each carries $\mathbf{1 0}$ marks.

a) Draw and explain the circuit of a differential amplifier.
b) Realise an active first order high pass filters using OPAMPS for a lower cut off frequency of 1 KHz and a pass band gain of 2 .

16 a) Derive an expression for voltage gain of an inverting and non-inverting operational amplifier.
b) Compare active and passive filters.

17 a) Draw and explain a sample and hold circuit. Quote a few of its applications.
b) Explain the terms CMRR and Slew Rate of an OPAMP. Also specify the typical values for IC 741.

18 a) Draw and explain the circuit of a Schmitt Trigger using OPAMPS. Explain the terms UTP and LTP of a Schmitt Trigger.
b) Compare binary weighted and R-2R ladder D/A Converters.

19 a) Draw and explain the circuit of a summing amplifier using OPAMP. Realise $\mathrm{Y}(\mathrm{t})=5 \mathrm{~V}_{1}+2 \mathrm{~V}_{2}-4 \mathrm{~V}_{3}$ where $\mathrm{V}_{1}, \mathrm{~V}_{2}$ and $\mathrm{V}_{3}$ are input magnitudes.
b) Sketch and explain the circuit of a monostable multivibrator using IC 555.

20 a) Explain the circuit of a Wein Bridge Oscillator using OPAMPS
b) Design an Astable Multivibrator using IC 555 for a frequency of operation 2 KHz and a duty cycle $60 \%$.

