

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

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

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
**THIRD SEMESTER B.TECH DEGREE EXAMINATION, MAY 2019**

**Course Code: CS207**

**Course Name: ELECTRONIC DEVICES AND CIRCUITS**

Max. Marks: 100

Duration: 3 Hours

**PART A**

*Answer all questions, each carries 3 marks.*

Marks

- |   |                                                                                                                                                    |     |
|---|----------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 1 | Derive the input- output relationship of an RC integrator circuit.                                                                                 | (3) |
| 2 | Draw and explain the circuit of a 78XX IC based voltage regulator.                                                                                 | (3) |
| 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. | (3) |
| 4 | Distinguish between<br>(i) Series and Shunt Clippers<br>(ii) Positive and Negative Clippers                                                        | (3) |

**PART B**

*Answer any two full questions, each carries 9 marks.*

- |   |                                                                                                                                                                                       |     |
|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 5 | a) Draw and explain the circuit of a voltage doubler.                                                                                                                                 | (3) |
|   | 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.                      | (6) |
| 6 | a) Draw and explain the transistorised sweep circuit using a normally off transistor switch.                                                                                          | (4) |
|   | b) Draw and explain the circuit of a series voltage regulator.                                                                                                                        | (5) |
| 7 | a) Design circuits using passive components to perform the following waveform conversions:<br>(i) 2 KHz triangular wave to square wave<br>(ii) 0.5 KHz square wave to triangular wave | (4) |
|   | b) Draw and explain the block diagram of SMPS.                                                                                                                                        | (5) |

**PART C**

*Answer all questions, each carries 3 marks.*

- |    |                                                                   |     |
|----|-------------------------------------------------------------------|-----|
| 8  | Explain thermal runaway in transistors.                           | (3) |
| 9  | Draw the circuit of a monostable multivibrator using transistors. | (3) |
| 10 | Compare BJT and FET.                                              | (3) |
| 11 | State and explain Barkhausen Criteria.                            | (3) |

**PART D**

*Answer any two full questions, each carries 9 marks.*

- 12 Design an RC Coupled Amplifier using transistors with the following specifications : (9)  
 $V_{cc} = 12\text{ V dc}$ ,  $I_c = 2\text{ mA}$ ,  $h_{fe} = 125$ , Lower cut off frequency = 100 Hz, Upper cut off frequency = 100 KHz.
- 13 a) What are the effects of cascading on the gain and bandwidth of transistor amplifier circuits. (3)
- b) Sketch and explain a Wein Bridge Oscillator using transistors. Explain how conditions for sustained oscillations are satisfied in this circuit. (6)
- 14 With neat sketches and waveforms, explain the working of an Astable Multivibrator using transistors. (9)

**PART E**

*Answer any four full questions, each carries 10 marks.*

- 15 a) Draw and explain the circuit of a differential amplifier. (5)
- 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. (5)
- 16 a) Derive an expression for voltage gain of an inverting and non-inverting operational amplifier. (6)
- b) Compare active and passive filters. (4)
- 17 a) Draw and explain a sample and hold circuit. Quote a few of its applications. (6)
- b) Explain the terms CMRR and Slew Rate of an OPAMP. Also specify the typical values for IC 741. (4)
- 18 a) Draw and explain the circuit of a Schmitt Trigger using OPAMPS. Explain the terms UTP and LTP of a Schmitt Trigger. (6)
- b) Compare binary weighted and R-2R ladder D/A Converters. (4)
- 19 a) Draw and explain the circuit of a summing amplifier using OPAMP. Realise  $Y(t) = 5V_1 + 2V_2 - 4V_3$  where  $V_1$ ,  $V_2$  and  $V_3$  are input magnitudes. (5)
- b) Sketch and explain the circuit of a monostable multivibrator using IC 555. (5)
- 20 a) Explain the circuit of a Wein Bridge Oscillator using OPAMPS (5)
- b) Design an Astable Multivibrator using IC 555 for a frequency of operation 2 KHz and a duty cycle 60%. (5)

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