

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
Third semester B.Tech degree examinations (S) September 2020

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

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| 1 | Draw a differentiator circuit and draw the input and output waveforms for square wave input. | (3) |
| 2 | Draw the input and output waveforms of a sweep circuit using a transistor as a switch. Sketch the relevant circuit diagram. | (3) |
| 3 | What are the different types of DC to DC converters. | (3) |
| 4 | Compare JFET with BJT. | (3) |

PART B

Answer any two full questions, each carries 9 marks.

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| 5 | a) Assuming suitable values, design an integrator circuit for a 1 KHz square wave. Draw the relevant waveforms and circuit with designed components. | (5) |
| | b) Draw the circuit diagram of a three pin regulator for obtaining a 5V output. | (4) |
| 6 | a) Draw the circuit of a transistor shunt regulator and explain its working. | (5) |
| | b) Design a circuit to convert a bipolar signal to a signal having value between 0V and above, without change in wave shape. | (4) |
| 7 | a) Draw the internal structure of IC723 and explain its working. | (5) |
| | b) Draw the circuit of a voltage tripler and plot the waveforms. | (4) |

PART C

Answer all questions, each carries 3 marks.

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| 8 | What is the significance of a load line in an amplifier? | (3) |
| 9 | Why are multistage amplifiers used? What are its drawbacks? | (3) |
| 10 | How does a crystal oscillator work? What are its advantages? | (3) |
| 11 | Draw the circuit of a RF tuneable oscillator and write the equation for finding its frequency of operation. | (3) |

PART D

Answer any two full questions, each carries 9 marks.

- 12 a) Why is potential divider biasing more stable and independent of transistor characteristics than other biasing arrangements. (5)
- b) Design a transistor based circuit for generating a square wave of 1KHz. (4)
- 13 a) Design an amplifier using self biasing for maximum output swing of approximately 10V and maximum collector current of 1 mA. Given $\beta=100$, $V_{BE}=0.7V$, draw the circuit using the designed components. (5)
- b) Draw the circuit diagram of a monostable multivibrator and explain its working. (4)
- 14 a) Design a transistor based Wien bridge oscillator for an output frequency of 5 KHz. Draw the circuit using the designed components. (5)
- b) Draw the circuit diagram of a common source MOSFET amplifier and explain its working. (4)

PART E

Answer any four full questions, each carries 10 marks.

- 15 a) With necessary figures, explain the concept of 'virtual ground' in an operational amplifier. (4)
- b) Design a second order active low pass filter for 2.5 KHz, with a pass band gain of 4dB. Draw the circuit with the designed components. (6)
- 16 a) Compare the characteristics of an ideal operational amplifier with IC741. (5)
- b) Design a first order active high pass filter for 3.3 KHz, with a pass band gain of 3dB. Draw the circuit with the designed components. (5)
- 17 a) Design a Schmitt trigger circuit using an operational amplifier when input voltage, $|V_{in}| > 3V$. Assume an op-amp power supply voltage of $\pm 12 V$. Draw the circuit diagram and relevant waveforms. (5)
- b) Prove that a weighted resistor network can convert a digital signal to analog signal. What are the drawbacks of this converter? (5)
- 18 a) With the help of a circuit diagram and necessary equations, show how an operational amplifier can be used to find the difference between two voltages. (5)
- b) With the help of necessary figures, explain the working of a 2 bit flash ADC. (5)

- 19 a) Draw the figure of an operational amplifier differentiator and prove that the output is proportional to derivative of the input. (5)
- b) With the help of necessary figures, explain the working of a mono-stable multivibrator using IC555. (5)
- 20 a) Design a Wien bridge oscillator using an operational amplifier for 1.5 KHz. (5)
Draw the circuit diagram and relevant waveforms.
- b) Draw the block schematic of a dual slope analog to digital converter and explain its working. (5)

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