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Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
THIRD SEMESTER B.TECH DEGREE EXAMINATION(R&S), DECEMBER 2019

Course Code: CS207

Course Name: ELECTRONIC DEVICES AND CIRCUITS

Max. Marks: 100

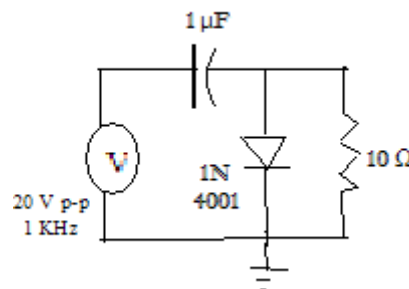
Duration: 3 Hours

PART A

Answer all questions, each carries 3 marks.

Marks

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|---|--|-----|
| 1 | Trace the response of a RC differentiator circuit to square wave input for the designed frequency and justify circuit action. Also plot the Lissajous pattern for a sinusoidal input | (3) |
| 2 | Design a circuit to obtain 10V peak to peak trapezoidal waveform from 230 V mains | (3) |
| 3 | Design a loaded 5V zener regulator for a load current of 20 mA. Input voltage is 12 V dc. Assume that zener knee current is 5 mA. | (3) |
| 4 | Verify whether the following circuit will work as a clamper | (3) |



PART B

Answer any two full questions, each carries 9 marks.

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|---|---|-----|
| 5 | a) Draw and explain the circuit of a voltage tripler. | (5) |
| | b) With the help of relevant characteristics curve, verify whether a FET can be used as a resistance | (4) |
| 6 | a) Draw and explain the transistorised sweep circuit using a normally on transistor switch | (4) |
| | b) Draw and explain the circuit of a series voltage regulator using transistors. Show how fold back current limiting can be implemented in the circuit. | (5) |

- 7 a) Design a circuit using passive components to convert a 1 KHz triangular wave to a square wave (3)
- b) With the help of a block diagram, explain the working of an SMPS (6)

PART C

Answer all questions, each carries 3 marks.

- 8 The output of a transistor based RC coupled amplifier appears clipped during both half cycles. Identify possible issues and suggest solutions. (3)
- 9 What are the different feedback arrangements used in amplifiers and oscillators (3)
- 10 Sketch and explain a common source MOSFET amplifier (3)
- 11 Explain the working of a crystal oscillator (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)
- $V_{cc} = 10 \text{ V dc}$, $I_c = 2 \text{ mA}$, $h_{fe} = 100$, Lower cut off frequency = 100 Hz, Upper cut off frequency = 100 KHz.
- Justify the shape of the frequency response curve.
- 13 Sketch and explain a Wein Bridge Oscillator using transistors. Examine how Barkhausen criteria is satisfied in this circuit (9)
- 14 With neat sketches and relevant waveforms, explain the working of an Astable Multivibrator using transistors. For the circuit if $\frac{R1}{R2} = \frac{1}{m}$ and $\frac{C1}{C2} = \frac{1}{n}$ where R1, R2, C1 and C2 denote timing components as usual, prove that the duty cycle of the output waveform is $\frac{1}{1+mn}$ (9)

PART E

Answer any four full questions, each carries 10 marks.

- 15 a) Compare ideal and actual parameters of an OPAMP (4)
- b) Draw and explain the circuit of a summing amplifier using OPAMPs. Realise $Y(t) = 5 + 3 \sin \omega t - 6 \cos \omega t$ using IC 741 (6)
- 16 a) Sketch and explain an OPAMP integrator. Realise an active integrator using IC741 for a frequency of 2 KHz (6)
- b) Compare active and passive filters (4)
- 17 a) Draw and explain a sample and hold circuit. Cite a few of its applications (7)
- b) Quote a few practical applications of OPAMPS (3)

- 18 a) With neat sketches, explain a differential amplifier (6)
b) Compare binary weighted and R-2R ladder D/A Converters (4)
- 19 a) 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)
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 1 KHz and a duty cycle of 60% (5)
