Department of Electrical Engineering
Midterm Exam
Date: 25/04/2020

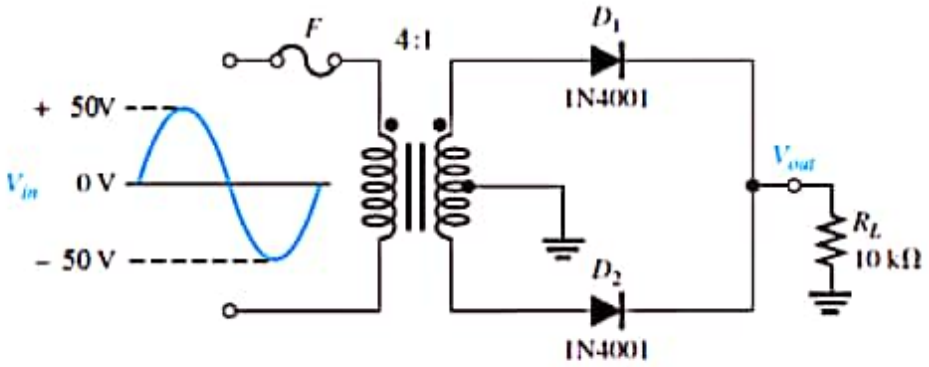
Course Details

Course Title: Electronic Devices and Circuits **Module:** _____
Instructor: _____ **Total Marks:** 30

Student Details

Name: _____ **Student ID:** _____

Student Signature: _____

Q1.		**For the circuit given in figure 1, answer and solve following problems.** a) What type of circuit is this? (1) b) What is the total peak secondary voltage? (1) c) Find the peak voltage across each half of the secondary. (1) d) What is the peak current through each diode? (2) e) What minimum PIV rating must the diodes have? (2)  **Figure 1**	Marks 07 CLO 02
Q2.		Determine the ripple factor for the filtered bridge rectifier with a load as indicated in Figure 2	Marks 05 CLO 02

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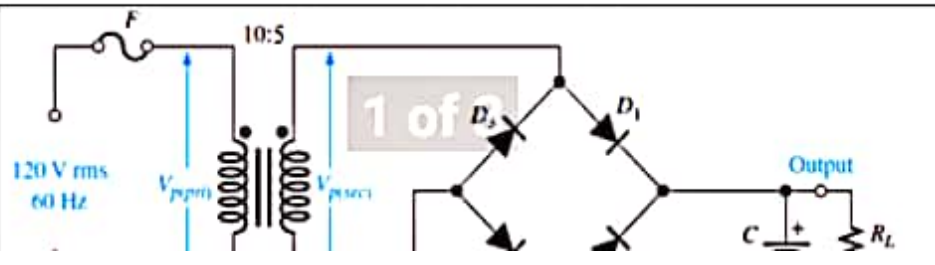

1 of 2

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Q1

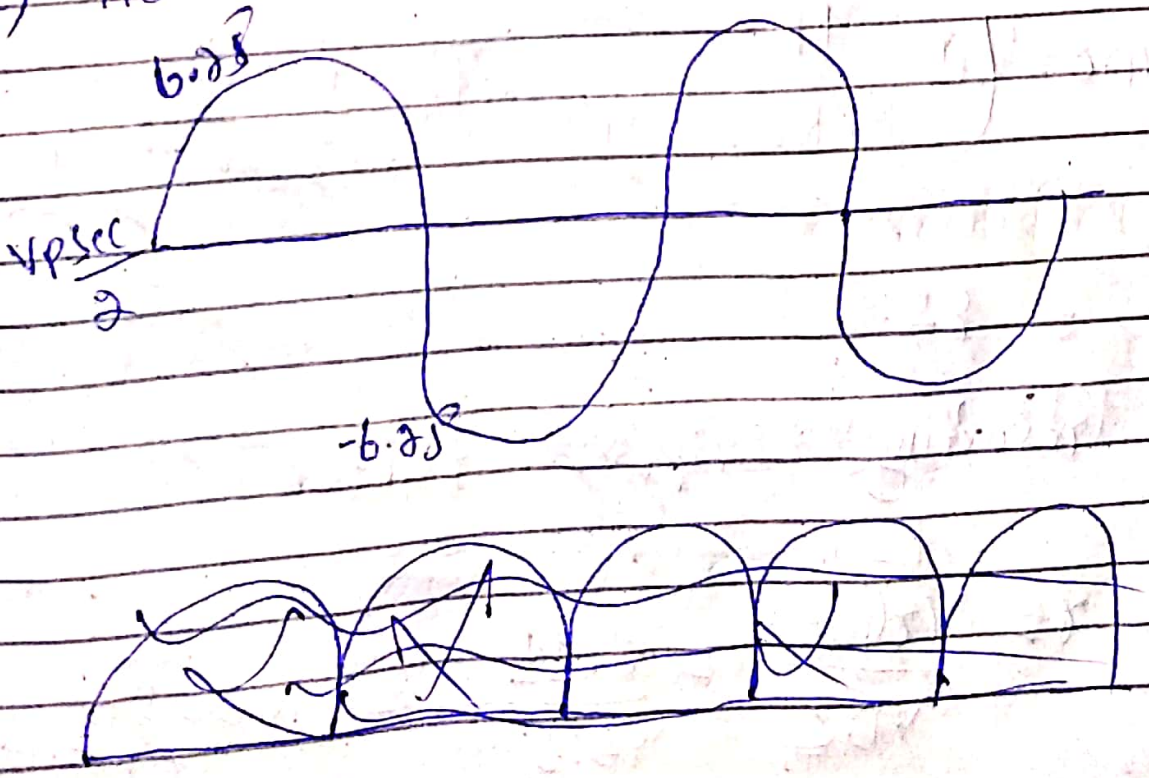
Ans This is a Center Tapped Full wave rectifier circuit.

b) Total peak secondary voltage

$$V_{p(sec)} = n V_{p(pri)} = 0.25 (50) = 12.5\,V$$

$$V_{p(sec)} = 12.5\,V.$$

c) Half of the secondary voltage.



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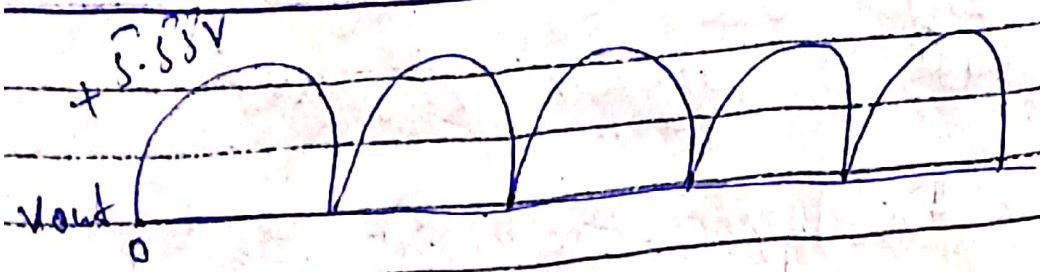

There is 6.25 v peak to peak voltage the output voltage has a peak value of 6.25 − 0.7 which is diode drop.

d) Peak Current through Each Diode

$$I_F = \frac{V_{p(sec)} - 0.7}{R_L} = \frac{5.55}{10K\Omega} = 0.0005S$$

$$= 0.555\ mA.$$

e) PIV rating must diode here

$$PIV = 2V_{p(out)} + 0.7$$

$$= 2(5.55V) + 0.7$$

$$= 11.8V.$$

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Q2.

Sol Determine the ripple Factor

Transformer Turn ratio is n=0.5

Peak Primary voltage

$V_p(Pri) =$

$V_{peak} = V_{RMS} \times \sqrt{2}$

$= 120 \times 1.414 = 170V$

The peak Secondary voltage

$V_p(sec) = (0.5)(170) = 85V$

The undiode Full wave rectifier voltage is

$V_p(rect) = V_p(sec) - 1.4V =$

$85V - 1.4 = 83.6$

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The frequency..... of Full wave rectifier voltage is 120Hz

$$V_r(PP) = \left(\frac{1}{fR_2C}\right) V_p(rect) =$$

$$\left(\frac{1}{(120Hz)(3300)(100uF)}\right) 83.6$$

$$V_r(PP) = 2.11$$

The Approximately dc value of output voltage is determined as follows

$$V_{DC} = \left(1 - \frac{1}{2fRLC}\right) V_p(rect) = \left(1 - \frac{1}{2(120)(3300)(100)}\right) \times 83.6$$

$$= 82.33$$

resulting ripple factor

$$r = \frac{V_r(PP)}{V_{DC}} = \frac{2.11}{82.344} = 0.02536 \quad \text{Ans}$$

Percentage ripple $= 2.62\%$

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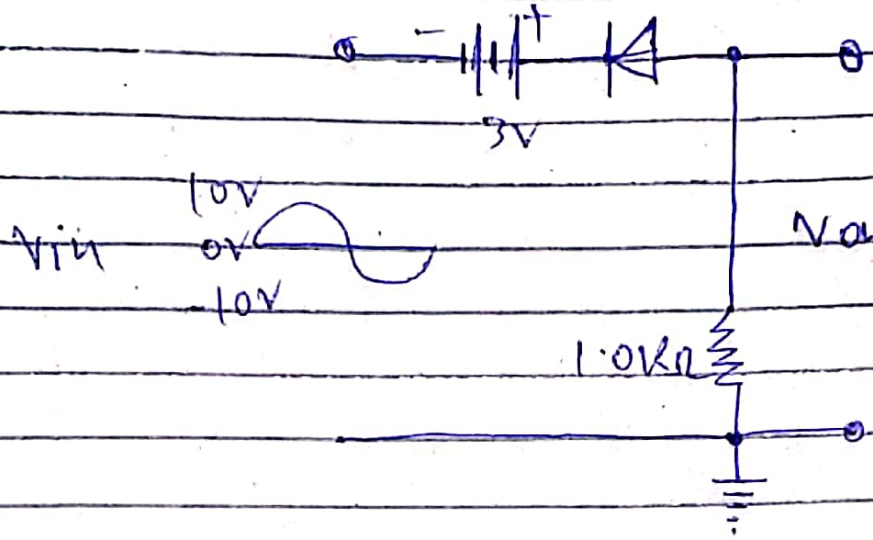
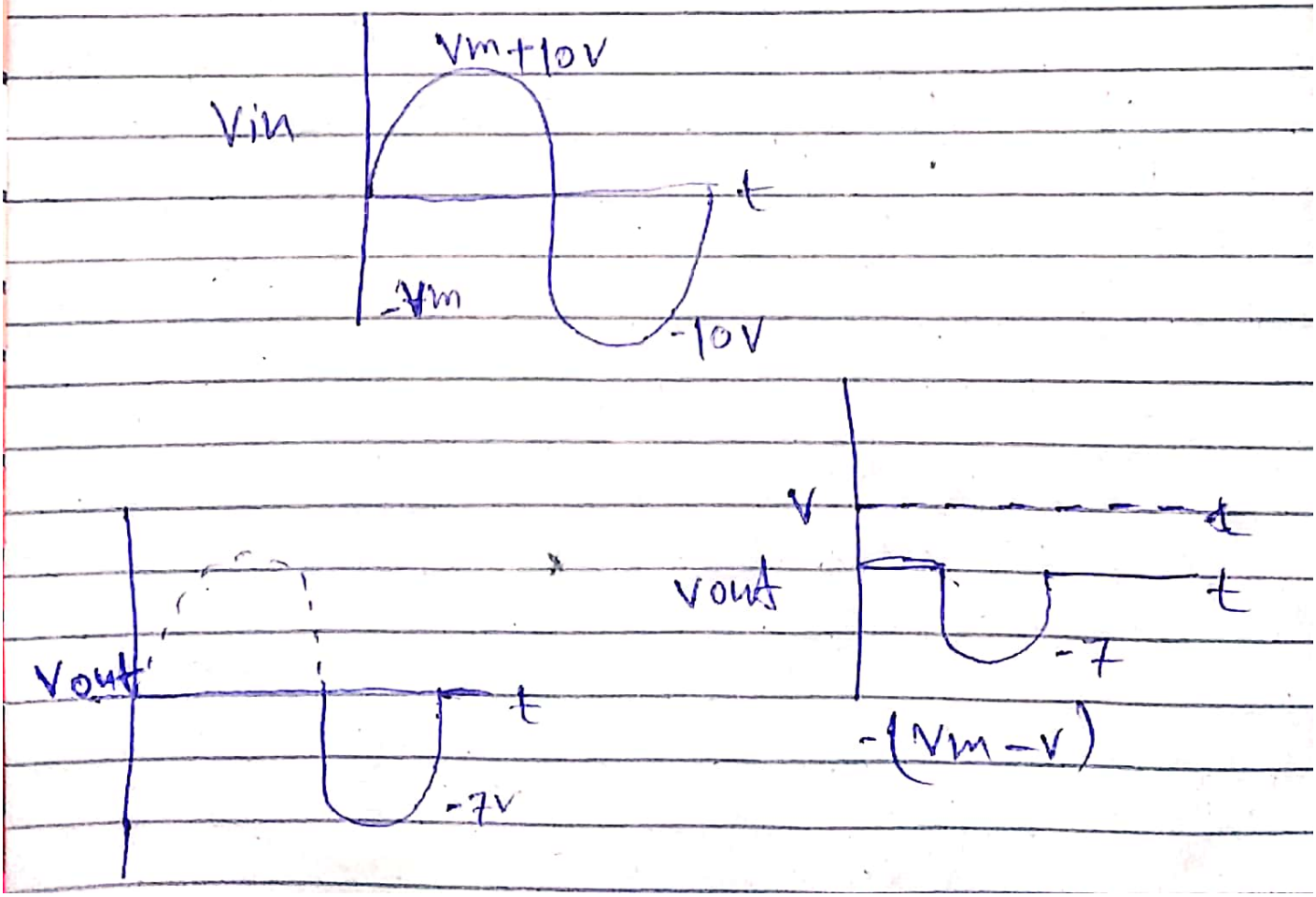
PTA BS

Cl3:-



output waveform of clipper ckt.



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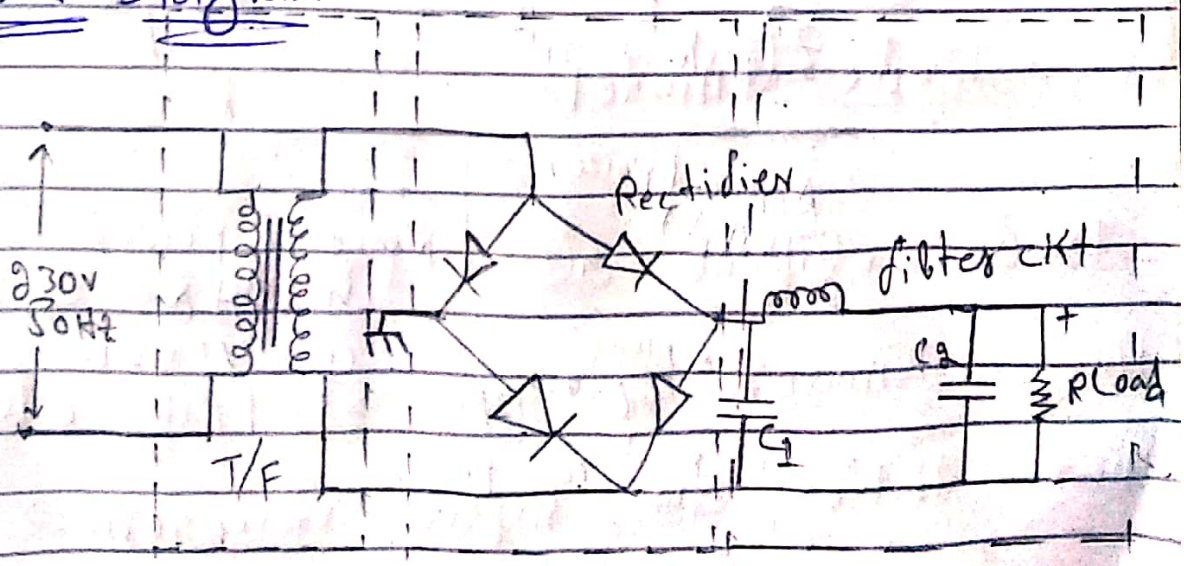
(5) (c) Power Supply filter and its operation

Power Supplies Capacitors are used to smoth filter the pulsating DC output After rectification so that a nearby constant DC voltage is supplied to the load.

Filter ckt the capacitor is charged to the peak of the.

But here are certain disadvantages in using an unregulated power supply.

Circuit Diagram.



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Cls b) n-Typ and p-Type.

Doping of semiconductors pentavalent impurities impurity Atoms with 5 valence electrons produce n-Type semiconductor by contributing extra electrons.

Trivalent impurities impurity Atoms with 3 valence electrons produce p-Type semiconductor by producing a hole or electron deficiency.

Cls Diode limiter.

Diode clipper also known as a Diode Limiter. a wave shapping ckt that takes an input waveform

and clips or cuts of its top half botton or both halves together. This chipping the input signal produces an output waveform that resembles a flatted version of the input.

Difference b/w positive and negetive limiter

Series-negetive Limiter limits the negetive portion of the input pulse. The difference b/w a seriel-positive limiter is that the diode is reversed in the negetive limiter. in the parallel Limitter the positive portion of the input signal is limited when the Diode conducts.

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C(3d)

Ans

Capacitor.

. Vin becomes negative the capacitor Acts as a battery of the same voltage of Vin.

The voltage source and the capacitor Conteract each other, resulting in the net voltage of zero as seen by the load.

C(3e)

Ans when a 60 Hz Sinusoidal voltage is Applied to the input of a half-wave rectifier the output Freequency is 120 Hz. Sinusoidal voltage is Twice that the half wave.

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Cl.5(F)

The voltage ripple is smoothed by using a capacitor it tries to hold the peak voltage Across the Load.

when the load is minimum then load resistance is High and draw a negligible Current voltage Across the Load is Approximately equal to source voltage ripple in voltage is depend on the load.

Also small change dv/dt due to ripple can not affect the load so much.

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Q8 g.

Ans

Diode limiter also called clipper as it used to limit the input voltage. A basic diode ~~voltage~~ limiter ckt is composed of a diode and resistor.

The clipping of input signal produces an input signal produces an output waveform the resemble version of input.

Diode clampers.

A clamping Diode circuit is one consisting of a Diode Capacitor and a resistor to limit the output voltage to a specified range.

The Diode is connected parallel to the load.

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