D. J. SANGHVI COLLEGE OF ENGINEERING
DEPARTMENT OF ELECTRONICS ENGINEERING
ELX302: ELECTRONIC DEVICES AND CIRCUITS 1 SEM III
ASSIGNMENT 02

28^{th} **August, 2017** **[Total Marks: 50]**

1. **Assume any suitable data if necessary**
2. **Read the questions carefully before attempting**
3. **Questions to be attempted by B1 batch : 01,05,09,10,12,13,15,18**
4. **Questions to be attempted by B2 batch : 02,06,09,10,12,14,16,18**
5. **Questions to be attempted by B3 batch : 04,07,09,11,12,13,17,18**
6. **Questions to be attempted by B4 batch (excluding diploma) : 03,08,09,11,12,14,16,18**

1. How does a half-wave rectifier differs from the full-wave center-tapped rectifier in the following aspects: **[05]**
    a) Fundamental ripple frequency in the output
    b) Rectified dc voltage
    c) Ripple Factor and T.U.F
    d) Average dv load current
    e) Peak inverse voltage

2. How does a half-wave rectifier differs from the full-wave bridge rectifier in the following aspects: **[05]**
    a) Fundamental ripple frequency in the output
    b) Rectified dc voltage
    c) Ripple factor and T.U.F
    d) Average dv load current
    e) Peak inverse voltage

3. Define the following for a rectifier with examples: **[05]**
    a) Ripple factor
    b) Rectifications efficiency
    c) Transformer utilization efficiency

4. Give reasons: **[05]**
    a) Bleeder resistance is required in LC filters.
    b) PIV is important in rectifiers.

5. Draw circuit diagram of bridge rectifier with capacitor filter and explain its working with neat sketches and relevant waveforms. Also derive the expression for ripple factor. **[05]**

6. Draw circuit diagram of bridge rectifier with Inductor filter and explain its working with neat sketches and relevant waveforms. Also derive the expression for ripple factor. **[05]**

7. Draw circuit diagram of bridge rectifier with LC filter and explain its working with neat sketches and relevant waveforms. Also derive the expression for ripple factor. **[05]**

8. Draw circuit diagram of bridge rectifier with π filter and explain its working with neat sketches and relevant waveforms. Also derive the expression for ripple factor. **[05]**

9. Design a full wave rectifier using center tapped secondary winding with LC filter to meet the following specifications: **[05]**

   a) Output dc voltage: 15 V

   b) Output load current: 200 mA

   c) Ripple factor less than 0.08

   ✠ Justify the use of bleeder resistor in the designed circuit with LC filter.

   ✠ Give specifications/ratings of the circuit components such ss transformer, diode, choke, capacitors and resistors in both the designed circuits.

10. Consider the circuit in figure 1 **[10]**

    a) What type of circuit is this

    b) What is the total peak secondary voltage

    c) Find the peak voltage across each half of the secondary

    d) Sketch the voltage waveform across R_L

    e) What is the peak current through each diode

    f) What is the PIV for each diode

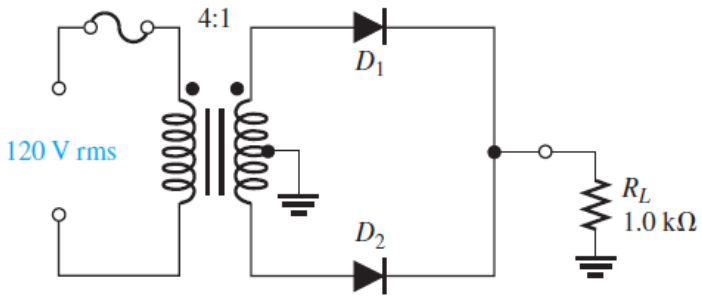

Figure 1: Question 10

11. Consider the circuit in figure 2 **[10]**

a) What is the dc output voltage

b) Sketch the output waveforms

c) Is the line voltage decreases to 105 V, what is the dc output voltage

d) What is the PIV for each diode

e) If the turn ration changes to 3:1, what is the PIV

f) If the filter capacitor is open, what is the dc output voltage

g) If only one diode is open, what is the dc output voltage

h) Is somebody builds the circuit with electrolytic capacitor reversed, what kind of trouble is likely to happen

i) If the load resistance opens, what changes will occurs in the output voltage

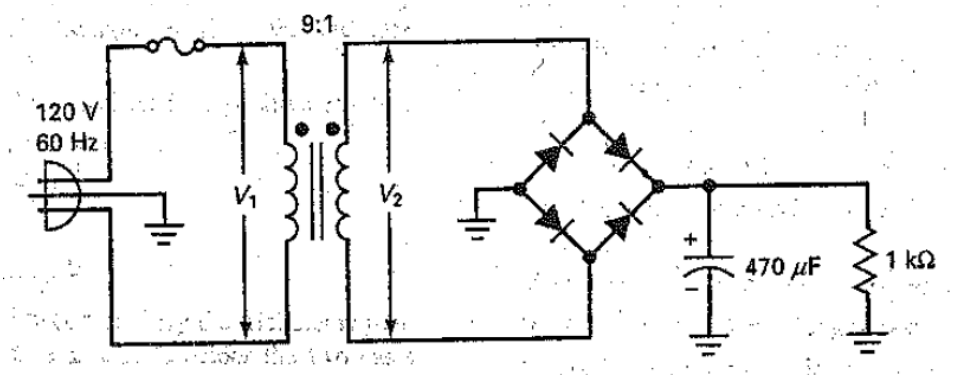

Figure 2: Question 11

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12. Give reasons: **[05]**

    a) JFET is a unipolar device.

    b) JFET behaves as voltage controlled current source.

    c) JFET is never operated with forward V_{GS} voltage.

    d) In a JFET, input characteristics cannot be plotted.

13. With the help of neat diagram and sketches explain the construction, characteristics (both transfer and output) and working of a typical n- channel JFET. **[05]**

14. With the help of neat diagram and sketches explain the construction, characteristics (both transfer and output) and working of a typical p- channel JFET. **[05]**

15. Draw output and transfer characteristics of a typical JFET in common source configuration on a graph paper with proper scale and explain how will you obtain the values of all parameters (i.e $I_{DSS}, g_m, V_P, r_{ds}$) of JFET from the same and calculate these from the characteristics drawn by you. **[05]**

    ✠ Note: Use JFET Hardware experimental readings for plotting

16. How can you tell whether an FET is operating in ohmic region or the saturation region **[05]**

17. What are the different types of MOSFETs and draw symbol of each type. Also explain the difference between Enhancement type and depletion type MOSFET **[05]**

18. With the help of neat diagram and sketches explain the construction, characteristics and working of a typical n- channel enhancement type MOSFET. **[10]**

    ✠ Note: Working and characteristics (both transfer and output) should be w.r.t cutoff, ohmic(or non-saturation or linear) and saturation regions.

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