DEPARTMENT OF ELECTRNICS & COMMUNICATION ENGINEERING, KITSW

COURSE: **U14EI 205 - BASIC ELECTRONICS ENGINEERING**	**ECE-I, Semester-II, 2015-16**

ASSIGNMENT-4

Topic	Assignment Posted On	Submission Due On
Filters, and Special Diodes	29.02.2016	**12.03.2016**

Note:

- ***Write the answers legibly and neatly***.
- *Use a different color pen for writing questions and draw a horizontal line at the end of each answer*
- *Leave left margin on each page*
- *Write only on one side of the page. This will facilitate you to use the other side to add extra notes or to incorporate any corrections to your solutions after verifying them with the solutions posted on course web page.*
- *After all, You will be referring to class notes and assignment notes for MSEs and ESE. Your objective of writing assignments is not for the sake of submitting, only to get assignment marks. Writing assignments is a part of learning process, after listening to class lectures.*
- ***Make an honest effort to solve the assignment problems. In case of difficulty, discuss with friends / Teacher and refer to solutions as a last resort. Finally, rework the solutions on your own for submission***
- *You will be graded based on the quality of your work.* Please do not let your efforts go in vain
- *Class notes and Assignment will keep you in comfortable position in MSEs and ESE*

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Read carefully, the expectations from each answer and present them in detail

1. **Show that the percentage regulation of both HWR and FWR is $(R_f / R_L)100\%$, where R_f is diode's forward resistance (or R_d), R_L is load resistance**

   [Writing something about HWR or FWR without drawing ckt , input and output waveforms, the answer is incomplete: Similarly the case with other answers

   You are expected to cover: (i) Ckt diagram of HWR, (ii) Input v_i and Output voltage v_o waveforms of HWR, (iv) derive the values of V_{dc} (v) $V_{no-load} = V_{dc} = V_m / \pi, V_{full-load} = (V_{dc} - I_{dc} R_f)$ or $I_{dc} R_L$, (vi) use them in $\%regulation = [(V_{no-load} - V_{full-load}) / (V_{full-load})]100\%$ (vi) what must be ideal regulation (vii) comment on derived % regulation, (viii) Repeat for FWR]

2. **Explain the effect of inductor as filter. Show how output of a FWR changes with variation in inductance value. Derive an expression for the ripple factor of FWR with inductor filter.**

   [*You are expected to cover: (i) what is the need for filter, (ii) Behavior of Inductor to ac and dc , mention that "Inductor opposes any change in the current that flows through it", (iii) Draw ckt diagram of FWR with L-filter, (iv) Input v_i ,Output v_o waveform of FWR, Output v_o waveform of FWR with L-filter (v) derive expression for ripple factor with L-filter, (vi) whether L-filter can be used for light loads or heavy loads*]

3. Derive an expression for the ripple factor of FWR with Capacitor filter.

   [*You are expected to cover: (i) what is the need for filter, (ii) Behavior of capacitor to ac and dc (iii) Draw ckt diagram of FWR with C-filter, (iv) Input v_i ,Output voltage v_o waveform of FWR, Output voltage v_o waveform of FWR with C-filter (v) derive the expression for ripple factor with C-filter, (vi) comment on whether C-filter can be used for light loads or heavy loads*]

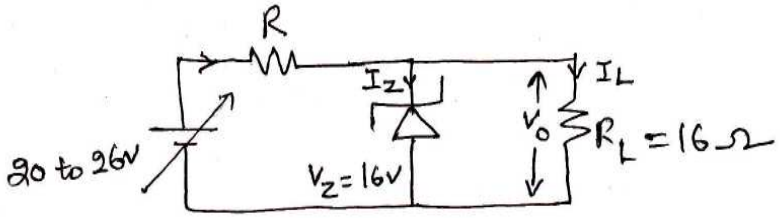
4. Derive an expression for the ripple factor of FWR with L Section or LC filter.
   [*You are expected to cover: (i) what is the need for filter, (ii) Behavior of Inductor and capacitor to ac and dc (iii) Draw ckt diagram of FWR with LC-filter, (iv) Input* v_i *,Output voltage* v_o *waveform of FWR, Output voltage* v_o *waveform of FWR with LC-filter (v) derive the expression for ripple factor with LC-filter, (vi) comment on dependency of ripple factor on Load resistance*]

5. Derive an expression for the ripple factor of FWR with Π or CLC filter.
   [*You are expected to cover: (i) what is the need for filter, (ii) Behavior of Inductor and capacitor to ac and dc (iii) Draw ckt diagram of FWR with CLC-filter, (iv) Input* v_i *,Output voltage* v_o *waveform of FWR, Output voltage* v_o *waveform of FWR with CLC-filter (v) derive the expression for ripple factor with CLC-filter, (vi) comment on dependency of ripple factor on Load resistance*]
6. Explain how a Zener diode can be used as Voltage Regulator
   [*You are expected to cover: (i) Explain the need for voltage regulation, (ii) what is Zener diode, (iii) draw V-I characteristic of Zener of diode (iv) Explain its operation during breakdown (v) mention manufacture specifications of zener, and define knee current, calculation of maximum zener current from specifications, (vi) Draw the ckt diagram of zener voltage regulator,(vii) mention why* R_s *is used (viii) Explain how this ckt provides line regulation, (ix) Explain how this ckt provides lord regulation*]

7. Explain the principle of operation of a Photo Diode
   [*You are expected to cover: (i) what is photodiode and how it is different from conventional diode, (ii) semiconductor materials used (iii) ckt symbol, (iv) In which mode it is operated (v) V-I characteristics at different light intensities, (vi) mention dark current, (vii) give construction details*]
8. Explain the principle of operation of a LED
   [*You are expected to cover: (i) what is LED and how it is different from conventional diode, (ii) principle of operation: emission of photons (ii) semiconductor materials used (iii) ckt symbol, (iv) In which mode it is operated (v) different semiconductor materials used and their colour of emission (vi) V-I characteristics for different colours*]

9. A 9.1 V Zener diode is specified with a maximum power dissipation of 364 mW. What is the maximum current the diode can handle ? [$Ans: I_{z-\max} = 40mA$]

10. The Zener shown has V_Z=16V.The voltage across load stays at 16V as long as the Zener current I_Z is maintained between 160mA and 2A.Find the value of the series resistance so that the output remains at 16V if the input varies between 20V to 26V. [*Ans: R=3.44 Ω]*



Instruction: Submit the solutions during the lunch break on or before due date @ Room No: B-I-208

Faculty: *K. Ashoka Reddy, Room #: BI-208*