2009 Qualifying Exam
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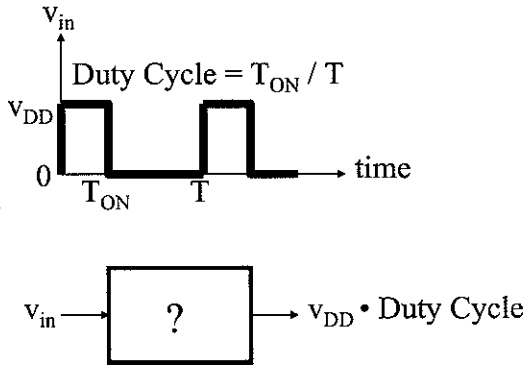

1. Design a circuit such that with the periodic input waveform shown, the output is approximately a DC voltage of V_{DD} • Duty Cycle.

   A low pass filter with bandwidth << 1/T;

   Possible Answers :

   R-C low pass filter with $2\Pi RC >> T$

   R-L low pass filter with $2\Pi L/R >> T$

   L-C filter with $2\Pi(LC)^{1/2} >> T$
   (Except for the peaking at resonant frequency, this filter has a low-pass behavior.)

2. If the output has to drive a heavy load (e.g., 1A), how will you modify the circuit ?

   Possible Answers :

   R-C low pass filter will not be appropriate as the small load resistance will increase the effective bandwidth.

   R-L low-pass filter will be fine, but the small load resistance will decrease the effective bandwidth.

   L-C filter will not be significantly affected by the load resistance. The peaking will be reduced.

   Add a unity gain voltage buffer that is capable of driving the heavy load.