N.B. (1) Question No. 1 is compulsory.
(2) Solve any three questions from remaining questions.
(3) Assume suitable data if necessary.

1. Solve any four:
   (a) What is the need of Input offset voltage compensation and how it can be achieved. 
   (b) Design RC phase shift oscillator to produce sinusoidal output of 5KHz. 
   (c) Design schmitt trigger circuit to achieve upper and lower threshold voltage as 1.5 volts.
   (d) Explain Resolution, Accuracy and settling time with respect to DAC.
   (e) Design a Flasher circuit using IC 555, in which lamp should remain on for 4 sec and off for 2 sec.

2. (a) Derive closed loop parameters for Inverting opamp.
   (b) Design a second order KRC low pass filter with a cut off frequency f0 = 2KHz and Q = 5.

3. (a) Design a triangular wave generator to get the output frequency of 1.5 KHz and 
      $V_{o\ (p-p)} = 7.5V$ using IC 741.
   (b) Explain counter type ADC with neat diagram.

4. (a) Calculate output voltage for the given amplifier.

   ![Diagram of Amplifier](image)

   $V_1 = 1.5 V$
   $V_2 = 3 V$
   $V_3 = 4 V$
(b)  
(i) Prove that opamp can be used as current to voltage converter.  
(ii) Compare normal rectifier with precision rectifier.  
(iii) Define different parameters of PLL.

5. (a) Explain different comparators, state different applications and suggest modifications for practical comparator.  
(b) What are different possible IC 723 based voltage regulators. Design voltage regulator to achieve $V_o = 12\text{V}$ and $I_o = 1\text{Amp}$.  

6. (a) Explain function of each block of PLL.  
(b) Design voltage Regulator using IC LM317 for the given specifications. $V_o = 12 \pm 3\text{ volts}$ and $I_L = 100\text{mA}$. 