

(3 Hours)

[Total Marks: 80]

- N.B.:** (1) **Question No. 1 is compulsory.**
 (2) **Solve any three questions from the remaining five.**
 (3) **Figures to the right indicate full marks.**
 (4) **Assume suitable data if necessary and mention the same in answer sheet.**

Q.1 Attempt any 4 questions: [20]

- (A) Give any five features of IC 555.
 (B) How does precision rectifier differ from conventional rectifier?
 (C) In a Fig. 1(C) using multiplier IC AD534, show that the output voltage is

$$V_o = \frac{(V_x^2 - V_y^2)}{10}$$

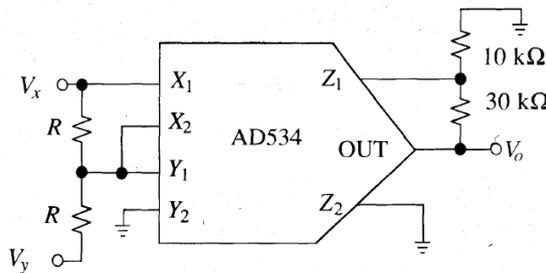


Fig. 1(C)

- (D) Draw a neat circuit diagram and input-output waveforms of an inverting Schmitt trigger. Give the expressions for its threshold levels.
 (E) If the input to the ideal comparator shown in the Fig. 1(E) is a sinusoidal signal of 8 volt peak to peak without any DC component, then check whether the duty cycle of the output of comparator is 33.33% or 25% or 20%. Prove it.

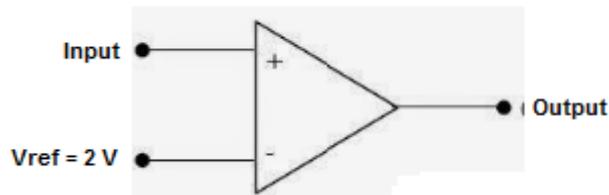


Fig. 1(E)

- Q.2** (A) With the help of a neat circuit diagram explain any one application of PLL 565. [10]
 (B) Design a square wave generator using IC 555 for an output frequency of 5 kHz and an adjustable duty cycle of 70% to 90%. [10]
- Q.3** (A) Draw a neat circuit diagram of a Wein bridge oscillator using op-amp. Derive its frequency of oscillation. What are the values of R and C for frequency of oscillation to be 10 kHz? [10]
 (B) Draw a neat circuit of voltage to current converter with floating load and derive the expression for its output current. [10]

- Q.4** (A) Design a Second order Butterworth non-inverting high pass filter to provide a cut-off frequency of 5 KHz and pass band gain of $AF=2$. [10]
- (B) Design a counter for counting a sequence 5, 6, 7, 8...15, 5... using MSI 74163 IC. The pin terminology and functionality of MSI 74163 is given in Fig. 4(B). [10]

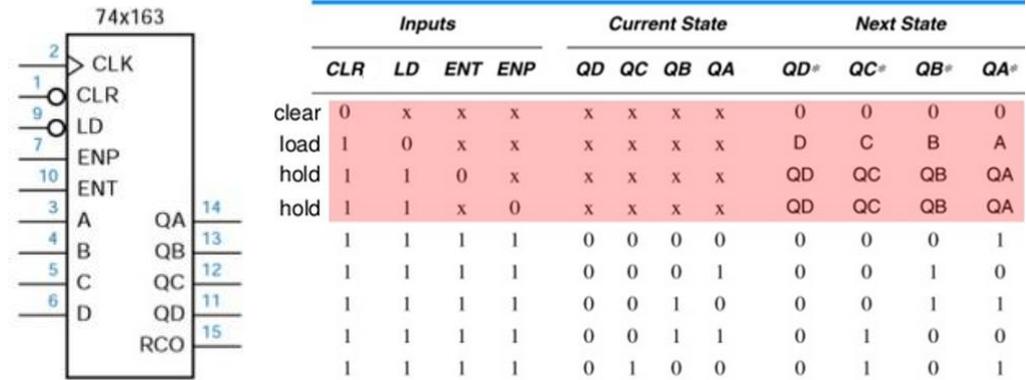


Fig. 4(B)

- Q.5** (A) With the help of functional block diagram explain the working of voltage regulator LM317 to give an output voltage variable from 5 V to 10 V to handle maximum load current of 500 mA. [10]
- (B) What is an instrumentation amplifier? Draw its neat circuit using three op-amps. Design instrumentation amplifier for variable gain of 0.5 to 100. [10]
- Q.6** **Write short notes on: (Attempt any two)** [20]
- (A) Current fold-back protection in IC 723.
- (B) Sample and Hold Circuit.
- (C) IC74181 Arithmetic Logic Unit.

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