

(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

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

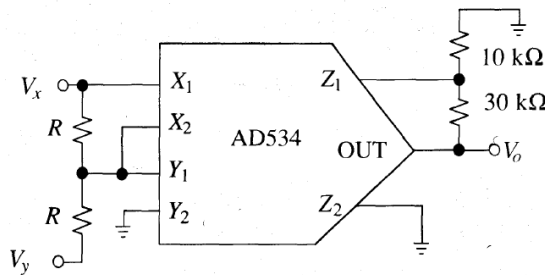


Fig. 1(C)

- (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.

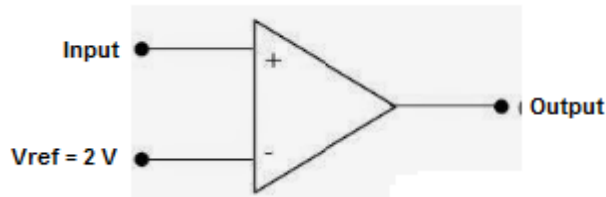


Fig. 1(E)

- 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]

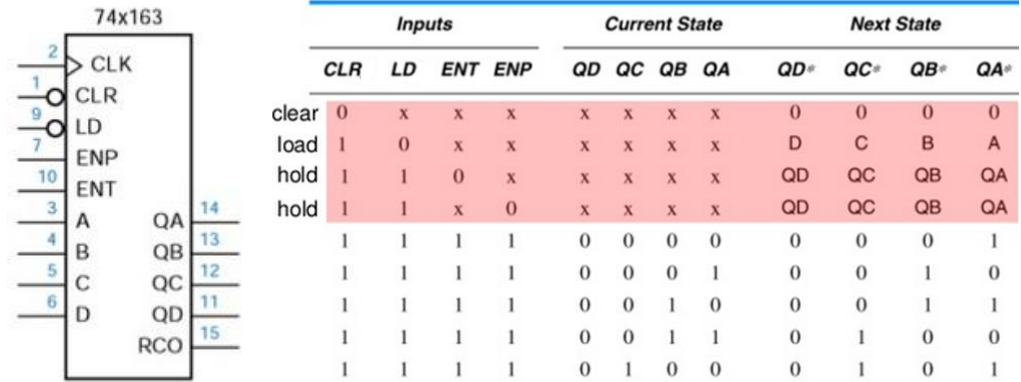


Fig. 4(B)

- 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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