

- 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) How does precision rectifier differ from conventional rectifier?
 (B) If the input to the ideal comparator shown in the Fig. 1(B) 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.

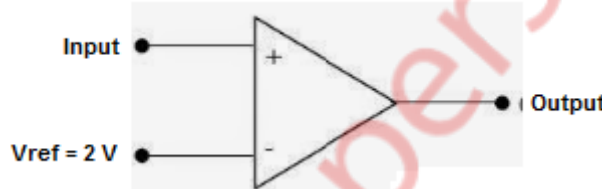


Fig. 1(B)

- (C) With neat circuit diagram derive an expression for output current of a voltage to current converter with floating load.
 (D) With the help of a neat circuit diagram explain any one application of PLL 565.
 (E) What is CMRR? How to measure it practically?

Q.2 (A) Draw the circuit diagram of a square and triangular waveform generator using opamps and explain its working with the help of waveforms. For variation in duty cycle what is the modification needed in the circuit. [10]

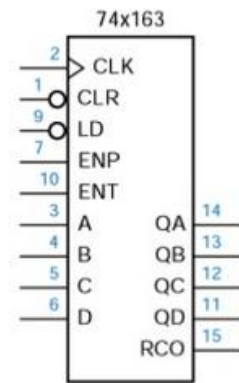
- (B) With the help of a functional block diagram explain the working of voltage regulator LM317 to give an output voltage variable from 5 V to 10 V to handle maximum load current of 500 mA. [10]

Q.3 (A) Draw a neat circuit diagram of a Wein bridge oscillator using opamp. Derive its frequency of oscillation. What are the values of R and C if its frequency of oscillation is 1 kHz? [10]

- (B) Design a voltage regulator using IC 723 to give $V_o = 3\text{ V}$ to 37 V and output current of 2A. [10]

Q.4 (A) Design a second order Butterworth high pass filter for cut off frequency of 1 kHz and pass-band gain of $AF=2$. [10]

- (B) Design a counter for counting a sequence 3, 4, 5, 6...12, 3... using IC MSI 74163. The pin terminology and functionality of IC MSI 74163 is given in Fig. 4(B). [10]



	Inputs				Current State				Next State			
	CLR	LD	ENT	ENP	QD	QC	QB	QA	QD*	QC*	QB*	QA*
clear	0	x	x	x	x	x	x	x	0	0	0	0
load	1	0	x	x	x	x	x	x	D	C	B	A
hold	1	1	0	x	x	x	x	x	QD	QC	QB	QA
hold	1	1	x	0	x	x	x	x	QD	QC	QB	QA
	1	1	1	1	0	0	0	0	0	0	0	1
	1	1	1	1	0	0	0	1	0	0	1	0
	1	1	1	1	0	0	1	0	0	0	1	1
	1	1	1	1	0	0	1	1	0	1	0	0
	1	1	1	1	0	1	0	0	0	1	0	1

Fig. 4(B)

- Q.5** (A) With the help of a neat diagram and voltage transfer characteristics explain the working of a non-inverting Schmitt trigger. Derive the expressions for its threshold levels. [10]
- (B) Draw and explain the functional block diagram of IC 555 and explain its operation in monostable mode. Draw its various waveforms. [10]
- Q.6** Write short notes on: (Attempt any two) [20]
- (A) Voltage to frequency converter.
- (B) IC 74181 Arithmetic Logic Unit.
- (C) Waveform generator XR 2206.