

(Time: 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:
- (a) Give ideal characteristics of op-amp and give their practical values. [05]
 - (b) Compare linear and switching voltage regulator. [05]
 - (c) Design a circuit for $V_o = V_1 + V_2$ using single op-amp and few resistors. [05]
 - (d) What are the advantages of switch capacitor filters? [05]
 - (e) Explain op-amp as window detector. [05]
- Q.2 (a) With the help of a neat diagram and voltage transfer characteristics explain the working of an inverting Schmitt trigger. Derive the expressions for its threshold levels. [10]
- (b) Draw a neat circuit diagram of a Wien bridge oscillator using op-amp. Derive its frequency of oscillation. What are the values of R and C for frequency of oscillation to be 965 Hz? [10]
- Q.3 (a) Draw the circuit diagram of a square and triangular waveform generator using op-amp and explain its working with the help of waveforms. [10]
- (b) The circuit given in Fig. 3(b) is similar to that of internal diagram of IC555 with slight modifications in the internal resistances to value $2R$. Analyse this circuit and draw the waveforms at output terminal v_{out} and across the capacitor C . Comment on the duty cycle of output waveform when i) R_A is less than R_B , ii) R_A is equal to R_B , and iii) R_A is greater than R_B . [10]

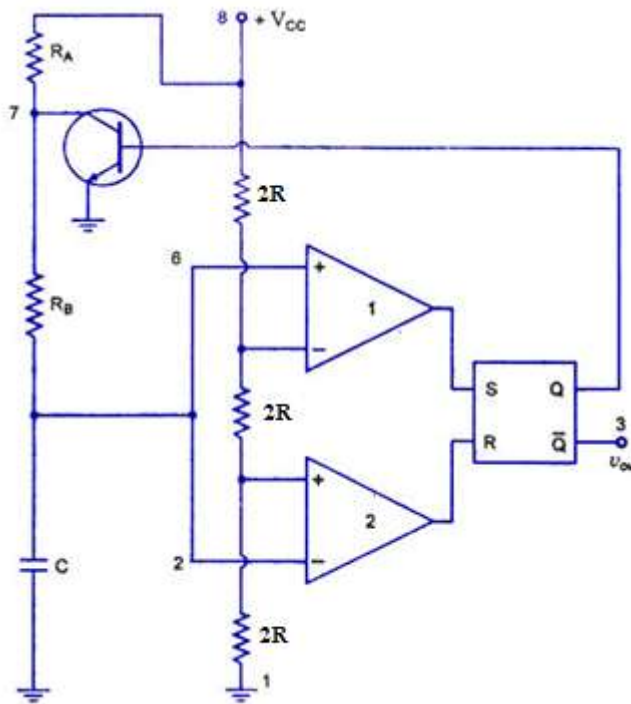


Fig. 3(b)

- 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) With a neat circuit derive an expression for the output of an instrumentation amplifier. [10]
- Q.5 (a) With neat circuit explain R/2R ladder digital to analog converter. [10]
(b) With the help of a functional block diagram explain the working of voltage regulator LM317 to give an output voltage variable from 6 V to 12 V to handle maximum load current of 500 mA. [10]
- Q.6 Short notes on: (Attempt any four)
- (a) Effect of swamping resistor. [05]
 - (b) Current fold-back protection circuit in voltage regulator. [05]
 - (c) Voltage to Current converter. [05]
 - (d) Peak detector circuit. [05]
 - (e) Working of PLL IC 565. [05]
