

**(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) Draw a neat circuit of Voltage to Current converter with floating load. Give its output expression. **[05]**
  - (B) Draw a neat diagram of non-inverting Schmitt trigger and its voltage transfer characteristics. **[05]**
  - (C) Discuss the various parameters of op-amp. **[05]**
  - (D) Draw the functional block diagram of IC 723. **[05]**
  - (E) Draw a neat circuit of half wave precision rectifier. Draw its input and output waveforms. **[05]**
- Q.2**
- (A) What is an instrumentation amplifier? Design an instrumentation amplifier using 3 op-amps for gain variation of 0.5 to 100. **[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 with all the component values of astable multivibrator using IC 555 to obtain 40% duty-cycle. **[10]**
  - (B) Design a second order Butterworth high pass filter for cut off frequency of 1 kHz and pass-band gain of  $AF=2$ . **[10]**
- Q.4**
- (A) Draw the circuit diagram of a square and triangular waveform generator using op-amps and explain its working with the help of waveforms. For variation in duty cycle what is the modification needed in the circuit. **[10]**
  - (B) Design a voltage regulator using IC 723 to give  $V_o = 10$  V to 32 V and output current of 2 A. **[10]**
- Q.5**
- (A) Draw a neat circuit diagram of RC phase shift oscillator using op-amp. Derive its frequency of oscillation. What are the values of R and C if its frequency of oscillation is 2 kHz? **[10]**
  - (B) Draw a mod-7 counter using IC 7490. Draw its timing diagram. **[10]**
- Q.6** Write short notes on: (Attempt any two)
- (A) Power amplifier LM380. **[10]**
  - (B) IC 74181 Arithmetic Logic Unit. **[10]**
  - (C) Internal structure of IC 7493. **[10]**

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