

- 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 half wave precision rectifier. Draw its input and output waveforms. [05]
  - (B) Draw a neat circuit with all the component values of mono-stable multivibrator for timer application using IC 555 to obtain a pulse width of 1.1 ms. Take timing capacitor of value 1  $\mu$ f. [05]
  - (C) Draw a neat circuit of Current to Voltage converter. Give its output expression. [05]
  - (D) Draw the functional block diagram of IC 723. [05]
  - (E) Draw the internal structure of IC 7490 decade counter. Draw its timing diagram. [05]
- Q.2 (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 1 kHz? [10]
- (B) Draw a mod-10 counter using IC 7493. Draw its timing diagram. [10]
- Q.3 (A) With the help of a neat diagram and voltage transfer characteristics explain the working of inverting Schmitt trigger. Derive the expressions for its threshold levels. [10]
- (B) Design a voltage regulator using IC 723 to give  $V_o = 4$  V to 32 V and output current of 2 A. [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 second order Butterworth high pass filter for cut off frequency of 1 kHz and pass-band gain of AF=2. [10]
- Q.5 (A) What is an instrumentation amplifier? Draw a neat circuit of an instrumentation amplifier using 3 op-amps. Derive its output voltage equation. [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.6 Write short notes on: (Attempt any two)
- (A) Various parameters of op-amp. [10]
  - (B) IC 74181 Arithmetic Logic Unit. [10]
  - (C) Power amplifier LM380. [10]

\*\*\*\*\*