Q. P. Code : 588201

Time: 3Hours   **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 required and mention the same in the answer sheet.

1.   Solve **any five** :-   20
     (a)   Compare the inverting & non inverting configurations of operational amplifiers.
     (b)   Draw the diagram for a grounded load voltage to current converter and derive the expression for the output current.
     (c)   Design a first order non-inverting high pass filter to provide a cut-off frequency of 5 kHz.
     (d)   Explain the functional block diagram of Timer IC 555.
     (e)   Draw the waveforms for the outputs of IC 7490 with respect to the clock and hence explain its working as a decade counter.
     (f)   Explain simple current limit protection in voltage regulators.

2.   (a)   Draw a neat circuit diagram of an instrumentation amplifier using three op amps. Derive   10
            the expression for its gain. How can its gain be varied? What are its advantages over a
            difference amplifier using single op amp?
     (b)   With the help of a neat diagram explain the working of an R C phase shift oscillator using   10
            op amp. Derive the expression for its frequency of oscillation. What are the values of R &
            C if the frequency of oscillation is 5 kHz?

3.   (a)   With the help of a neat diagram, input and output waveforms and voltage transfer   10
            characteristics explain the working of an inverting Schmitt trigger. Derive the expressions
            for the upper & lower threshold levels. Explain how these levels can be varied.
     (b)   With the help of a neat diagram and waveforms at appropriate points in the circuit explain   10
            the working of a square and triangular waveform generator using op amps. Explain how
            the duty cycle of the square and triangular waveforms can be varied.

4.   (a)   Draw the functional block diagram of IC 723 voltage regulator and explain its working as   10
            a basic low voltage regulator. Design the same for an output of 5 V and load current upto
            200 mA.
     (b)   With the help of a neat functional block diagram explain the working of IC LT 1070   10
            Monolithic Switching regulator.

5.   (a)   Draw the diagram of a monostable multivibrator using timer IC 555. With the help of   10
            waveforms at the trigger input, across the charging capacitor and at the output explain its
            working. Design the same for a pulse width of 11 ms.
     (b)   With the help of neat circuit diagrams explain the working of a universal shift register IC   10
            74194 as a ring counter and twisted ring counter.

6.   Write short notes on **any four**   20
     (a) IC 74181 Arithmetic Logic Unit
     (b) IC 74169 4-bit up/down binary counter
     (c) IC 74164 serial input parallel output shift register
     (d) IC XR2206 waveform generator
     (e) IC 534 multiplier