

Time: 3 hours

Total Marks: 80

N.B.:

- 1) Question No.1 is compulsory
- 2) Solve any three from the remaining five.
- 3) Figures to the right indicate full marks.

Q. 1 Attempt any four questions.

- A. List characteristics of an ideal and practical operational amplifier. [5]
- B. What are the limitations of basic differentiator using op amp? Draw the circuit diagram of a practical differentiator and explain how it overcomes the limitations. [5]
- C. How are Precision Rectifiers different from simple diode rectifiers? Explain Half wave Precision Rectifiers. [5]
- D. Write a note on Pulse Width Modulator using IC 555. [5]
- E. Explain working of switching regulator. [5]
- F. With a diagram explain how IC 566 can be used as a voltage-controlled oscillator. [5]

- Q. 2** A. Draw a neat circuit diagram of an inverting summing amplifier using op-amp and obtain the expression for its output voltage as $V_O = - (V_1 + V_2 + V_3)$, where V_1, V_2, V_3 are input voltages. [10]

- B. Design an practical integrator using op-amp to integrate an input signal where lowest desired frequency of Integration is 1 kHz. [10]

- Q. 3** A. With the help of a circuit diagram, input and output waveforms and voltage transfer 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. [10]

- B. Explain monostable multivibrator using IC 555 with a neat circuit diagram and relevant waveforms. Calculate the value of timing resistor R for pulse width of 11 ms. Assume $C = 0.1 \mu F$. [10]

- Q. 4 A. Design an op-amp circuit to obtain $V_O = 2V_1 + 5V_2$ where V_1 & V_2 , are input voltages. [10]
- B. Design an adjustable output voltage regulator using IC 317 to give 7 to 10 Volts at $I_L = 1$ Ampere. Given $I_{ADJ} = 100 \mu A$. Choose $R_1 = 240 \Omega$ [10]
- Q. 5 A. With the help of a diagram explain the working of R C phase shift oscillator using op amp. Derive the expression for its frequency of oscillation. What are the values of R & C of the frequency determining network if its frequency of oscillation is 1 kHz? [10]
- B. With the help of a diagram and wave forms at appropriate points in the circuit explain the working of square and triangular waveform generator using op amps. [10]
- Q. 6 Write short notes on: (Attempt any four)
- A. Closed loop Inverting Amplifier using Op-amp [5]
 - B. Voltage to Current Converter [5]
 - C. Window detector [5]
 - D. Astable Multivibrator using IC 555 [5]
 - E. IC 723 as a High Voltage Low Current regulator [5]
 - F. IC 565 Phase Locked Loop (PLL) [5]
