

Time: 3 hours

Marks: 80

N.B: 1. Question No 1 is compulsory

2. Answer any three from the remaining.

1. Attempt any four from the following. (20M)
  - (a) Explain 78XX series voltage regulator.
  - (b) State various methods to achieve analog to digital conversion.
  - (c) Design RC phase shift oscillator to produce sinusoidal output of 5KHZ.
  - (d) Compare zero crossing detector with Schmitt trigger circuit.
  - (e) what is difference between normal rectifier & precision rectifier. Explain half wave inverting rectifier.
- 2.(a) Explain function of each block of PLL? (10M)
  - (b) Explain triangular wave generator to get the output frequency at 1.5 kHz and  $v_o$  (p-p) = 7.5 v using op-amp. (10 M)
- 3.(a) Explain waving R/2R ladder D/A convertor. (10M)
  - (b) Explain internal diagram of power amplifier LM 380. (10 M)
4. (a) Design 2<sup>nd</sup> order KRC low pass filter (LPF) for cut off frequency  $f_o=10\text{kHz}$  with quality factor  $Q=5$ . (10M)
  - (b) Draw and explain functional block diagram, working of IC 723. (10 M)
5. (a) Derive expression for voltage gain of inverting amplifier and hence design the same for voltage gain =20. (10M)
  - (b) what are the features of instrumentation amplifier, draw neat diagram of three op-amp instrumentation amplifier and hence derive equation of output voltage. (10M)
6. Answer any four (20 M)
  - (a) Ideal and practical characteristics of op-amp IC 741.
  - (b) Define following: Slew Rate, CMRR, PSRR
  - (c) window detector
  - (d) V to I convertor
  - (e) Sample and Hold circuit

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